Collaborative Statistics: Supplemental Course Materials

By:
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Online:
< http://legacy.cnx.org/content/col10586/1.2/ >

OpenStax-CNX

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Table of Contents

Introduction[1]

The following modules are based on the award-winning *Elementary Statistics* online course by authors Barbara Illowsky and Susan Dean. The content presented here was designed to be used as a complementary resource with their Collaborative Statistics[2] textbook/collection.

NOTE: The source documents for this collection can be found at http://sofia.fhda.edu/gallery/statistics/index.html[3] .

Course Management

The Course Syllabus (Section 1.1) provides instructors a basic framework for teaching this material to their students. Thi document is intended to serve as a starting point; instructors should use this document as a foundation for creating a learning experience customized to meet their students unique needs.

Video Lectures

As a part of their award-winning online course[4] , the authors have provided a number of video lectures. These half-hour segments can be used for self-study or as a complement to the Collaborative Statistics[5] textbook. The authors also provide videos instructing students on the use of the TI-83 calculator as used in the textbook and course activities and exercises.

Lecture Videos

- Chapter 1: Sampling and Data (Section 2.1)
- Chapter 2: Descriptive Statistics (Section 2.2)
- Chapter 3: Probability Topics (Section 2.3)
- Chapter 4: Discrete Distributions (Section 2.4)
- Chapter 5: Continuous Random Variables (Section 2.5)
- Chapter 6: The Normal Distribution (Section 2.6)
- Chapter 7: The Central Limit Theorem (Section 2.7)
- Chapter 8: Confidence Intervals (Section 2.8)
- Chapter 9: Hypothesis Testing - Single Mean and Single Proportion (Section 2.9)
- Chapter 10: Hypothesis Testing - Two Means, Two Proportions, Paired Data (Section 2.10)
- Chapter 11: The Chi-Square Distribution (Section 2.11)
- Chapter 12: Linear Regression and Correlation (Section 2.12)

TI-83 Calculator Video Tutorials

[1] This content is available online at <http://legacy.cnx.org/content/m17621/1.3/>.
[2] *Collaborative Statistics* <http://legacy.cnx.org/content/col10522/latest/>
[3] http://sofia.fhda.edu/gallery/statistics/index.html
[4] http://sofia.fhda.edu/gallery/statistics/index.html
[5] *Collaborative Statistics* <http://legacy.cnx.org/content/col10522/latest/>

- TI-83 Calculator Tutorial, Part 1[6]
- TI-83 Calculator Tutorial, Part 2[7]

[6] "Elementary Statistics: Video Lecture of TI-83 Calculator Instructions Pt. 1" <http://legacy.cnx.org/content/m17574/latest/>
[7] "Elementary Statistics: Video Lecture of TI-83 Calculator Instructions Pt. 2" <http://legacy.cnx.org/content/m17575/latest/>

Practice Exams, Problem Sets, and Quizzes

A number of practice tests and problem sets are provided for student self-evaluation and to provide opportunities for students to practice key concepts introduced throughout the course. Solutions to these exercises are provided as feedback to aid student retention and understanding. These problem sets may be used as homework assignments or self-directed study aids.

Skills Practice Exams

- Skills Practice Exam 1: Chapters 1, 2, & 12 (Section 3.1.1)
- Skills Practice Exam 2: Chapters 3, 4, 5, & 6 (Section 3.1.2)
- Skills Practice Exam 3: Chapters 7, 8, 9, & 10 (Section 3.1.3)

Practice Final Exams

- Practice Final Exam 1: Chapters 1 & 2 (Section 3.2.1)
- Practice Final Exam 2: Chapters 3 & 4 (Section 3.2.2)
- Practice Final Exam 3: Chapters 5, 6, & 7 (Section 3.2.3)
- Practice Final Exam 4: Chapters 8, 9, & 10 (Section 3.2.4)
- Practice Final Exam 5: Chapter 11 (Section 3.2.5)
- Practice Final Exam 6: Chapter 12 (Section 3.2.6)

In addition to the problem sets provided above, the following multiple-choice quizzes are provided as resources for instructors. These modules can be used as assignments or as templates for classroom assessments. Answers to these items are not provided.

Quizzes

- Chapter 1: Sampling and Data (Section 3.3.1)
- Chapter 2: Descriptive Statistics (Section 3.3.2)
- Chapter 3: Probability Topics (Section 3.3.3)
- Chapter 4: Discrete Distributions (Section 3.3.4)
- Chapter 5: Continuous Random Variables (Section 3.3.5)
- Chapter 6: The Normal Distribution (Section 3.3.6)
- Chapter 7: The Central Limit Theorem (Section 3.3.7)
- Chapter 8: Confidence Intervals (Section 3.3.8)
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- Chapter 10: Hypothesis Testing - Two Means, Two Proportions, Paired Data (Section 3.3.10)
- Chapter 11: The Chi-Square Distribution (Section 3.3.11)
- Chapter 12: Linear Regression and Correlation (Section 3.3.12)

Calculator Instructions

The following module contains a number of resources related to the TI-83 calculator and ways it can be used with the Collaborative Statistics[8] textbook and curriculum. This resource addresses many different function on the calculator, including calculation of the outliers, discrete mean, standard deviation, and random numbers.

- View the TI-83 Calculator Resources (Section 4.1)

[8] *Collaborative Statistics* <http://legacy.cnx.org/content/col10522/latest/>

Chapter 1

Course Management

1.1 Syllabus[1]

1.1.1 Course Description

Elementary Statistics is an introduction to data analysis course that makes use of graphical and numerical techniques to study patterns and departures from patterns. The student studies randomness with emphasis on understanding variation, collects information in the face of uncertainty, checks distributional assumptions, tests hypotheses, uses probability as a tool for anticipating what the distribution of data may look like under a set of assumptions, and uses appropriate statistical models to draw conclusions from data.

The course introduces the student to applications in engineering, business, economics, medicine, education, the sciences, and other related fields. The use of technology (computers or graphing calculators) will be required in certain applications.

1.1.2 Texts, Materials, and Plug-ins

1.1.2.1 Texts

These course materials are designed for use with Collaborative Statistics[2] by Barbara Illowsky and Susan Dean. This text may be used online or can be downloaded in PDF format at no cost through the Connexions website, or you may choose to purchase a low-cost printed copy using the "Order Printed Copy" link provided on the collection home page linked above.

Instructors wishing to customize this textbook can do so by creating a Connexions account[3] . Connexions accounts are free and allow users to rip, mix, and burn content by updating modules and creating custom collections of educational content. Please see the Connexions website[4] to learn more about Connexions and how you can use it to customize your students' learning experience at absolutely no cost.

1.1.2.2 Materials

Required Calculator: The TI-83 calculator is required. There are many examples that use the TI-83 calculator and contain the calculator instructions. YOU WILL BE TAUGHT HOW TO USE THE CALCULATOR IN THE COURSE LESSONS.

[1] This content is available online at <http://legacy.cnx.org/content/m17579/1.3/>.
[2] *Collaborative Statistics* <http://legacy.cnx.org/content/col10522/latest/>
[3] http://cnx.org/join_form
[4] http://cnx.org/aboutus/

Throughout the course, you will be given instructions for the TI-83 Calculator. Labs and projects make use of the TI graphing calculator and may be done individually or in groups of up to four.

Please download the TI-83 calculator guidebook[5] from this TI-83 Site. Follow the links for "TI-83 Plus Silver Edition" OR "TI-83 Plus" and use the "Guidebooks" link.

You can review a number of TI-83 resources at http://cnx.org/content/m17581/latest/ or review the video tutorials online (Part 1[6], Part 2[7]).

1.1.2.2.1 Other Calculators: TI-86 or TI-89

You may use the TI-86 or TI-89 calculator if you have one, but you must have the programs loaded into it from the following TI-86[8] or TI-89[9] Web pages.

Download the TI-86 Calculator Instructions[10] and follow the following links:

- TI-86 Advanced Statistics Program
- Advanced Statistics Guide infstat1.86g
- Collaborative Statistics: Workbook has many TI-86 calculator instructions in it.

Download the TI-89 Calculator Instructions[11] and follow these links:

- Statistics with List Editor.
- Find "Get the Statistics with List Editor App!" and "Statistics with List Editor Guidebook."

[5] http://education.ti.com/us/product/graphing.html
[6] "Elementary Statistics: Video Lecture of TI-83 Calculator Instructions Pt. 1" <http://legacy.cnx.org/content/m17574/latest/>
[7] "Elementary Statistics: Video Lecture of TI-83 Calculator Instructions Pt. 2" <http://legacy.cnx.org/content/m17575/latest/>
[8] http://education.ti.com/us/product/tech/86/down/download.html
[9] http://education.ti.com/us/product/tech/89/apps/appslist.html
[10] http://education.ti.com/us/product/tech/86/down/download.html
[11] http://education.ti.com/us/product/tech/89/apps/appslist.html

1.1.3 Homework and Suggested Grading

The purpose of homework is to help you learn the material in the course. You learn the most and do your best if you do the homework problems. You are expected to do the chapter PRACTICE in the workbook before attempting the homework. The answers to the Practice are in the back of the workbook. Then do the assigned odd numbered homework problems in the text and check those answers in the back of the text.

Homework	**Total Points**	**Lowest Points (out of 700) for:**	**Percentage**
Exams (3 @ 100 points each)	300	A: 630	90-100%
Quizzes (12 @ 10 points each, 3 lowest dropped)	90	B: 546	78-89%
Labs (2 @ 30 points each)	60	C: 462	66-77%
Projects (2 @ 75 points each)	150	D: 385	55-65%
Final Exam	100	F: Below 385	0-54%

Table 1.1

Chapter 2

Lecture Videos

2.1 Video Lecture 1: Sampling and Data[1]

Figure 2.1

2.2 Video Lecture 2: Descriptive Statistics[2]

Figure 2.2

2.3 Video Lecture 3: Probability Topics[3]

Figure 2.3

[1]This content is available online at <http://legacy.cnx.org/content/m17561/1.14/>.
[2]This content is available online at <http://legacy.cnx.org/content/m17562/1.9/>.
[3]This content is available online at <http://legacy.cnx.org/content/m17563/1.8/>.

2.4 Video Lecture 4: Discrete Distributions[4]

Figure 2.4

2.5 Video Lecture 5: Continuous Random Variables[5]

Figure 2.5

2.6 Video Lecture 6: The Normal Distribution[6]

Figure 2.6

2.7 Video Lecture 7: The Central Limit Theorem[7]

Figure 2.7

[4]This content is available online at <http://legacy.cnx.org/content/m17565/1.8/>.
[5]This content is available online at <http://legacy.cnx.org/content/m17566/1.8/>.
[6]This content is available online at <http://legacy.cnx.org/content/m17567/1.8/>.
[7]This content is available online at <http://legacy.cnx.org/content/m17568/1.11/>.

2.8 Video Lecture 8: Confidence Intervals[8]

Figure 2.8

2.9 Video Lecture 9: Hypothesis Testing with a Single Mean[9]

Note: A captioned version of this video is currently unavailable. This will be updated shortly.

Figure 2.9

2.10 Video Lecture 10: Hypothesis Testing with Two Means[10]

Figure 2.10

2.11 Video Lecture 11: The Chi-Square Distribution[11]

Figure 2.11

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[8]This content is available online at <http://legacy.cnx.org/content/m17569/1.8/>.
[9]This content is available online at <http://legacy.cnx.org/content/m17570/1.9/>.
[10]This content is available online at <http://legacy.cnx.org/content/m17577/1.8/>.
[11]This content is available online at <http://legacy.cnx.org/content/m17571/1.8/>.

2.12 Video Lecture 12: Linear Regression and Correlation[12]

Figure 2.12

[12]This content is available online at <http://legacy.cnx.org/content/m17572/1.8/>.

Chapter 3

Practice Exams and Quizzes

3.1 Skills Practice Exams

3.1.1 Skills Practice Exam 1: Chapters 1, 2, & 12[1]

Questions 1 – 4 use the following table and shows the lengths (in minutes) of 64 international phone calls using a prepaid calling card.

Length of call (minutes)	Frequency	Relative frequency	Cum. Relative Freq.
4	25	0.3906	
14	15		
24	10	0.1563	
34	9	0.1406	
44	4	0.0625	
54	1	0.0156	1.00

Table 3.1

Exercise 3.1.1.1 *(Solution on p. 81.)*

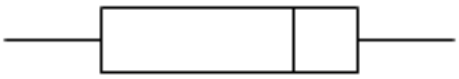
The histogram of this data looks to be:

A. Skewed right
B. Skewed left
C. Symmetrical

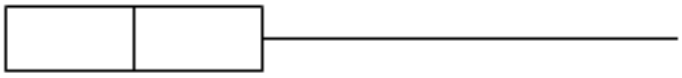
Exercise 3.1.1.2 *(Solution on p. 81.)*

Which of the following box plots most accurately displays the data?

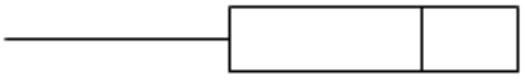
A.



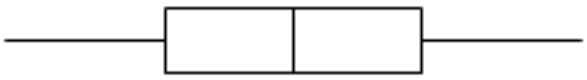
B.



C.



D.



Exercise 3.1.1.3 *(Solution on p. 81.)*

What percent of telephone calls were more than 24 minutes?

A. 15.63%
B. 21.88%

[1]This content is available online at <http://legacy.cnx.org/content/m17618/1.2/>.

C. 62.5%
D. 78.13%

Exercise 3.1.1.4 *(Solution on p. 81.)*
Find the 80th percentile.

A. 14
B. 24
C. 34
D. 70

Exercise 3.1.1.5 *(Solution on p. 81.)*
What can be said about a set of data when its standard deviation is small (but not zero)?

A. The data are far apart.
B. All of the data have the same value.
C. The mean of the data can never be zero.
D. The data are close together.

Questions 6 and 7, refer to the following: A sample of students was taken to determine pulse rate. The data is shown:

Pulse rate-beats per minute	54	58	65	68	72	76	80	90	98
Frequency (# of Students)	1	3	6	8	5	3	8	4	2

Table 3.2

Exercise 3.1.1.6 *(Solution on p. 81.)*
Find the median and mode(s).

A. 72, 68 and 80
B. 72 and 80
C. 76 and 68
D. 76, 68 and 80

Exercise 3.1.1.7 *(Solution on p. 81.)*
Out of the entire college population of 24,000 students, approximately what percent of students are expected to have a pulse rate of 65?

A. 6
B. 40
C. 9
D. 15

For questions 8 and 9, refer to the following: By determining the average number of people in a car using the "Diamond" Carpool Lane, the California Highway Patrol is trying to decide if the number of people in a car using the "Diamond" Carpool Lane should be increased from 2 to 3.

Exercise 3.1.1.8 *(Solution on p. 81.)*
The average number of people per car for all cars using the "Diamond" Carpool Lane is called the:

A. parameter
B. data

C. variable
D. statistic

Exercise 3.1.1.9 *(Solution on p. 81.)*
The number of people in 1 car is called the:

A. parameter
B. data
C. variable
D. statistic

Exercise 3.1.1.10 *(Solution on p. 81.)*
I toss a fair coin a large number of times. Assuming the tosses are independent, which of the following is true?

A. Once the number of flips is large enough, the number of heads will always be exactly half of the total number of tosses. For example, after 10,000 tosses I should have exactly 5,000 heads.
B. The proportion of heads will be about 1/2 and this proportion will tend to get closer to 1/2 as the number of tosses increases.
C. As the number of tosses increases, any long run of heads will be balanced by a corresponding run of tails so that the overall proportion of heads is exactly 1/2.
D. All of the above.

Questions 11 - 13, refer to the following: A sample of twenty people went on a cruise to Alaska. Their two-week weight gain is shown below (a weight loss is shown by a negative number.)

Weight Gain	Frequency
-2	4
0	5
2	8
5	2
9	1

Table 3.3

Exercise 3.1.1.11 *(Solution on p. 81.)*
The middle 50% of the data is between _____ and _____.

A. 0 and 2
B. 0 and 9
C. 2 and 9
D. 2 and 2

Exercise 3.1.1.12 *(Solution on p. 81.)*
Find the average weight gain (in pounds).

A. 1.35
B. 2.74
C. 2

D. There is not enough information.

Exercise 3.1.1.13 *(Solution on p. 81.)*
What weight gain is 3 standard deviations above the mean (in pounds)?

A. 4.05
B. 8.19
C. 9.57
D. There is not enough information

For questions 14 - 19, use the following information: Kim, a personal trainer, was interested in whether or not there was a linear relationship between the number of visits her clients made to the gym each week and the average amount of time her clients exercised per visit. She took the following data.

Client	1	2	3	4	5	6
Number of visits per week	1	3	4	2	3	5
Average time spent exercising per visit (hours)	2	1.5	1	2	2	0.30

Table 3.4

Exercise 3.1.1.14 *(Solution on p. 81.)*
The line that best fits the data is:

A. $\hat{y} = -0.44 + 2.62x$
B. $\hat{y} = 0.44 + 2.62x$
C. $\hat{y} = 2.62 + 0.44x$
D. $\hat{y} = 2.62 - 0.44x$

Exercise 3.1.1.15 *(Solution on p. 81.)*
Is the correlation coefficient significant?

A. Yes
B. No
C. It might be.
D. Not enough information is given.

Exercise 3.1.1.16 *(Solution on p. 81.)*
Using the best fit line, estimate the average time spent exercising per visit for 4 visits per week.

A. 2 hours
B. 0.86 hours
C. 1 hour
D. 10.04 hours

Exercise 3.1.1.17 *(Solution on p. 81.)*
Kim used the best fit line to estimate the average time spent exercising per visit for her client Toby who visited the gym 7 times per week. Does the least squares line give an accurate estimate?

A. Yes
B. No
C. Maybe
D. Not enough information is given.

Exercise 3.1.1.18 *(Solution on p. 81.)*
If the correlation coefficient is –1, which answer is correct?

A. The slope of the best fit line is positive.
B. The slope of the best fit line is –1.
C. The data fit exactly on a line with positive slope.
D. The data fit exactly on a line with negative slope.

Exercise 3.1.1.19 *(Solution on p. 81.)*
A scatter plot shows:

A. the direction and strength of a relationship between the independent and dependent variables.
B. that there is a linear relationship between the independent and dependent variables.
C. how you can predict the dependent variable knowing the independent variable.
D. nothing. The line of best fit is what is important.

Exercise 3.1.1.20 *(Solution on p. 81.)*
Suppose we are interested in the average grade on the first math 10 test taken by all students at De Anza during the spring 2002 quarter. We randomly choose 3 students from each of the spring 2002 Math 10 classes as our sample. This sampling technique is

A. systematic
B. cluster
C. stratified
D. convenience

Exercise 3.1.1.21 *(Solution on p. 81.)*
Tracy works at a local indoor soccer arena. He is interested in the proportion of people entering the area who spend money in the arena store. One night while he is working, Tracy counts the first 20 people who buy goods in the arena store.

A. systematic
B. cluster
C. stratified
D. convenience

3.1.2 Skills Practice Exam 2: Chapters 3, 4, 5, & 6[2]

Questions 1 – 2 refer to the following: Below is the probability distribution function for the number of high school years that students at a local high school play on a sports team.

X	$P(X = x)$	
0	0.32	
1	0.12	
2		
3	0.18	
4	0.14	

Table 3.5

Exercise 3.1.2.1 ***(Solution on p. 81.)***
What is the probability that $X = 2$?

A. 0.24
B. 0.76
C. 0.32
D. Cannot determine

Exercise 3.1.2.2 ***(Solution on p. 81.)***
Over the long run, the average number of years that we would expect students at this high school to play on a sports team is:

A. 0
B. 1.7
C. 2
D. 2.6

Exercise 3.1.2.3 ***(Solution on p. 82.)***
According to the 2000 United States Census, 12.3% of the population is Black or African American. The probability that a randomly selected U. S. resident is NOT Black or African American is:

A. 0.123
B. 0.877
C. 0.754
D. Cannot determine

Exercise 3.1.2.4 ***(Solution on p. 82.)***
Assume the statistics final is a multiple choice test with 40 questions. Each question has four choices with one correct answer per question. If you were to randomly guess on each of the questions, what is the probability of getting exactly the expected number of correct answers?

A. 0.5839
B. 0.5605
C. 0.25
D. 0.1444

[2]This content is available online at <http://legacy.cnx.org/content/m17619/1.3/>.

Exercise 3.1.2.5 *(Solution on p. 82.)*
In an exponential distribution, the mean is larger than the median.

A. true
B. false

Exercise 3.1.2.6 *(Solution on p. 82.)*
In Fall 1999, students in one Math 10 section determined that the length of movies at the cinema was normally distributed with a mean of 148 minutes and a standard deviation of 19 minutes. Find the third quartile and interpret it.

A. 75 minutes; Three-fourths of the movie lengths fall below 75 minutes.
B. 160.8 minutes; Three-fourths of the movie lengths fall below 160.8 minutes.
C. 160.8; Three-fourths of the movies last 160.8 minutes.
D. 75 minutes; Three-fourths of the movies last 75 minutes.

Exercise 3.1.2.7 *(Solution on p. 82.)*
Which of the following is FALSE about data that follows the normal distribution?

A. The mean is the same as the mode.
B. The standard deviation is the same as the mean.
C. The median is the same as the mode.
D. Most data is within 3 standard deviations of the median.

Exercise 3.1.2.8 *(Solution on p. 82.)*
The graph showing the age of getting a driver's license in California starts and peaks at age 16, and decreases from there. This shape most closely resembles what type of distribution?

a. Normal
b. Binomial
c. Uniform
d. Exponential

Use the following information for questions 9 and 10. The amount of time that a randomly chosen 6th grade student spends on homework per week is uniformly distributed from 30 to 120 minutes.

Exercise 3.1.2.9 *(Solution on p. 82.)*
What is the probability that a randomly chosen 6th grade student spends at least 60 minutes per week on homework knowing that he/she will spend at most 80 minutes per week on homework?

a. 1.20
b. 0.6667
c. 0.2222
d. 0.4

Exercise 3.1.2.10 *(Solution on p. 82.)*
What is the expected amount of time that a randomly chosen 6th grade student spends on homework per week?

a. 45 minutes
b. 60 minutes
c. 30 minutes
d. 75 minutes

Use the following information for questions 11 and 12. The length of time a randomly chosen 9-year old child spends playing video games per day is approximately exponentially distributed with a mean equal to 2 hours.

Exercise 3.1.2.11 *(Solution on p. 82.)*
Find the probability that a randomly chosen 9-year old will play video games at most 3 hours.

a. 0.7769
b. 0.9975
c. 0.0025
d. 0.2231

Exercise 3.1.2.12 *(Solution on p. 82.)*
70% of 9-year old children will play video games per day for at most how long?

a. 0.60 hours
b. 2.41 hours
c. 0.71 hours
d. Cannot determine

Use the following information for questions 13 and 14. Research has shown that studying improves a student's chances to 80% of selecting the correct answer to a multiple choice question. A multiple choice test has 15 questions. Each question has 4 choices.

Exercise 3.1.2.13 *(Solution on p. 82.)*
What is the distribution for the number of questions answered correctly when a student studies?

a. B(15, 0.80)
b. B(15, 0.25)
c. P(15)
d. P(6)

Exercise 3.1.2.14 *(Solution on p. 82.)*
Suppose that a student does not study for the test but randomly guesses the answers. What is the probability that the student will answer 7 or 8 questions correctly?

a. 0.2951
b. 0.0524
c. 0.0131
d. Cannot determine

Exercise 3.1.2.15 *(Solution on p. 82.)*
A downtown hotel determined the probability of finding X taxicabs waiting outside the hotel anytime between 5 PM and midnight. The information is shown in the table.

X	$P(X)$
1	0.0667
2	0.1331
3	0.2000
4	0.2667
5	0.3333

Table 3.6

What is the average number of taxicabs that are expected to be waiting outside the hotel anytime between 5 PM and midnight?

a. 3.7
b. 3
c. 0
d. 15

Exercise 3.1.2.16 *(Solution on p. 82.)*
. During the registration period for a new quarter, the De Anza College Registrar's Office processes approximately 75 applications per hour, on the average. What is the probability that it will process more than 80 applications for a randomly chosen hour? (This is a Poisson problem. If you did not cover the Poisson Distribution, then skip this problem.)

a. 0.0379
b. 0.2589
c. 0.7411
d. 0.0248

Questions 17 - 19 refer to the following: P(T) = 0.69 P(S) = 0.5, P(S | T) = 0.5

Exercise 3.1.2.17 *(Solution on p. 82.)*
Events S and T are:

a. mutually exclusive
b. independent
c. mutually exclusive and independent
d. neither mutually exclusive nor independent

Exercise 3.1.2.18 *(Solution on p. 82.)*
Find P(S AND T)

a. 0.3450
b. 0.2500
c. 0.6900
d. 1

Exercise 3.1.2.19 *(Solution on p. 82.)*
Find P(S OR T)

a. 0.6900
b. 1.19
c. 0.8450
d. 0

Exercise 3.1.2.20 *(Solution on p. 82.)*
Based on data from the US Census Bureau the average age of US residents is 36.31 with a standard deviation of 21.99. The data is normally distributed. The notation for the distribution is:

a. $X \sim N(36.31, 21.99)$
b. $X \sim N(21.99, 36.31)$
c. $X \sim B(36.31, 22)$
d. $X \sim U(0, 36.31)$

Exercise 3.1.2.21 *(Solution on p. 82.)*
In a binomial distribution we:

a. count the number of successes until a failure is obtained
b. count the number of trials until a success is obtained
c. count the number of successes in a finite number of trials
d. count the number of trials until the number of successes equals the number of failures

Exercise 3.1.2.22 *(Solution on p. 82.)*
Certain stocks have a probability of 0.6 of returning a $100 profit. They also have a probability of 0.4 of having a loss of $300. Over the long run, what is the best thing to do to maximize your profit, and why?

a. Invest in the stocks because there is a greater probability of making money than losing money.
b. Do not invest in the stocks because the dollar amount for each loss is greater than the dollar amount for each gain.
c. Invest in the stocks because making $100 per stock is preferred to losing $300 per stock.
d. Do not invest in the stocks because the expected value is a loss.

Questions 23 - 27 refer to the following table (data from the Institutional Research department of the Foothill-De Anza Community College District for De Anza College).

	American Indian	Asian/Pacific Islander	Black	Hispanic	White	Undeclared	Total
Administrator	0	3	5	5	21	0	34
Staff	1	35	21	30	201	16	304
Faculty	3	58	14	45	141	17	278
Total	**4**	**96**	**40**	**80**	**363**	**33**	**616**

Table 3.7

Suppose that one De Anza College employee is randomly selected.

Exercise 3.1.2.23 *(Solution on p. 82.)*
Find P (the employee is an Administrator)

a: 278/34
b: 304/616
c: 34/616
d: 80/616

Exercise 3.1.2.24 *(Solution on p. 82.)*
Find P (the employee is Faculty AND American Indian)

a: 382/616
b: 3/616
c: 3/4
d: 3/278

Exercise 3.1.2.25 *(Solution on p. 82.)*
Find P (employee is Staff OR Hispanic)

a. 384/616

b. 80/616
c. 304/616
d. 354/616

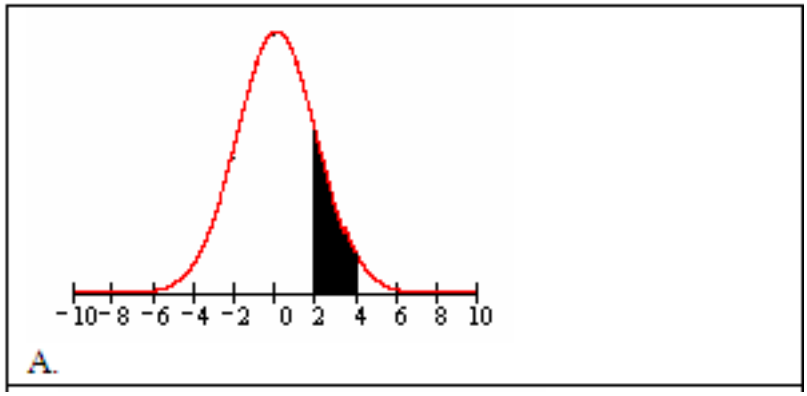
Exercise 3.1.2.26 *(Solution on p. 82.)*
Find P (employee is an Administrator GIVEN the employee is Black)

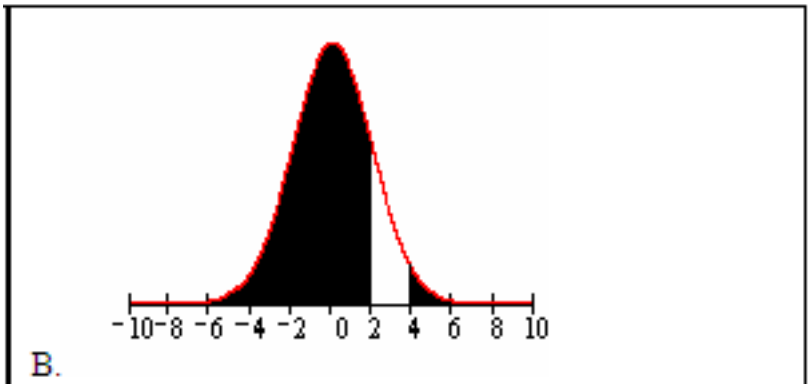
a. 40/616
b. 5/34
c. 5/616
d. 5/40

Exercise 3.1.2.27 *(Solution on p. 82.)*
Being an Administrator and an American Indian are

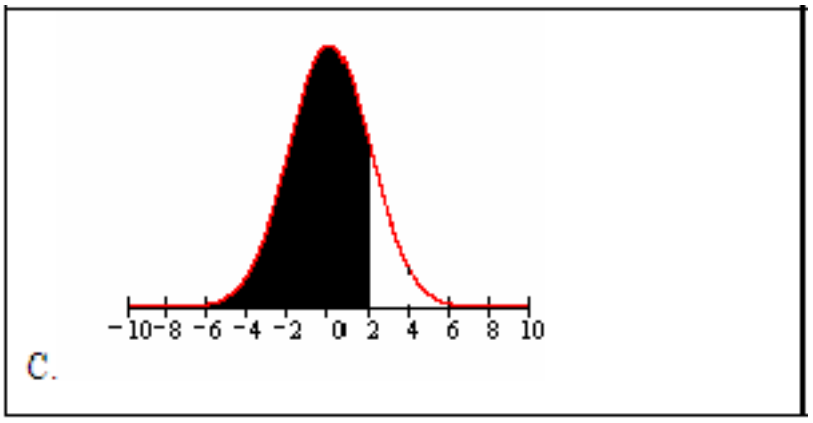
a. mutually exclusive events
b. independent events
c. mutually exclusive and independent events
d. neither mutually exclusive nor independent events

Exercise 3.1.2.28 *(Solution on p. 83.)*
P(X$gt; 4 or X < 2) is best described by which of the following graphs?

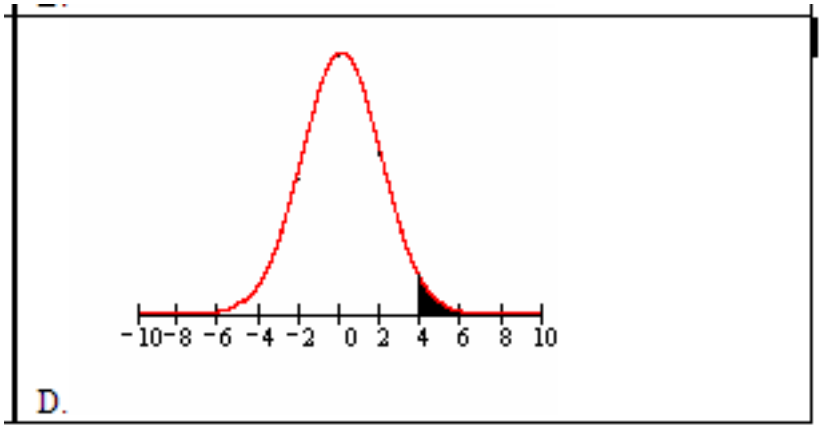
a.


b.


c.



d.



Questions 29 - 32 refer to the following: When a customer calls the "Help Line" at ABC Computer Software Co., the amount of time that a customer must wait "on hold" until somebody answers the line and helps the customer follows an exponential distribution with mean of 7.5 minutes.

Exercise 3.1.2.29 *(Solution on p. 83.)*

What is the probability that a customer waits more than 10 minutes to receive help?

a. 0.2636
b. 0.75
c. 0.7364
d. 0

Exercise 3.1.2.30 *(Solution on p. 83.)*

What is the 40th percentile of wait times for customers calling the help line?

a. 6.87 minutes
b. 3.83 minutes
c. 0.68 minutes
d. 0.122 minutes

Exercise 3.1.2.31 *(Solution on p. 83.)*

The customer wait time that is 1 standard deviation above the mean is:

a. 2.17 minutes
b. 7.5 minutes
c. 9.67 minutes

d. 15 minutes

Exercise 3.1.2.32 *(Solution on p. 83.)*
The probability that a customer calling the help line waits exactly 6 minutes for help:

a. 0
b. 0.45
c. 0.55
d. 0.8

Questions 33 – 35 refer to the following: ABC Delivery Service offers next day delivery of packages weighing between 2 and 20 pounds in a certain city. The have found that the weights of the packages they deliver are uniformly distributed between 2 and 20 pounds.

Exercise 3.1.2.33 *(Solution on p. 83.)*
What is the probability that a package weighs between 10 and 15 pounds?

a. 0.2778
b. 0.5556
c. 0.2500
d. 0.8333

Exercise 3.1.2.34 *(Solution on p. 83.)*
Given that a package weighs less than 10 pounds, what is the probability that it weighs less than 5 pounds?

a. 0.1667
b. 0.6250
c. 0.3750
d. 0.5000

Exercise 3.1.2.35 *(Solution on p. 83.)*
35% of packages weigh less than how many pounds?

a. 7.8 pounds
b. 8.3 pounds
c. 11.7 pounds
d. 13.7 pounds

Exercise 3.1.2.36 *(Solution on p. 83.)*
Suppose that the probability that an adult in California will watch a Giant's World Series game is 65%. Each person is considered independent. Of interest, is the number of adults in California we must survey until we find one who will watch a Giant's World Series game. What is the probability that you must ask 2 or 3 people? (This is a geometric problem. If you did not cover the geometric distribution, then skip this problem.)

a. 0.6500
b. 0.3071
c. 0.2275
d. 0.0796

Questions 37– 39 refer to the following: The amount of time De Anza students work per week is approximately normally distributed with mean of 18.17 hours and a standard deviation of 12.92 hours.

Exercise 3.1.2.37 *(Solution on p. 83.)*
The median is:

a: Not enough information
b: 12.92
c: 2.0
d: 18.17

Exercise 3.1.2.38 *(Solution on p. 83.)*
The 90th percentile for the amount of time De Anza students work per week is:

a. 1.61
b. 18.17
c. 90
d. 34.7

Exercise 3.1.2.39 *(Solution on p. 83.)*
Which of the following is NOT TRUE about the normal distribution?

a. the mean, median and mode are equal
b. the curve is skewed to the right
c. the curve never touches the x-axis
d. the area under the curve is one.

Exercise 3.1.2.40 *(Solution on p. 83.)*
We use the z-score to:

a. compare normal distributions with different averages and standard deviations
b. drive statistics students nuts
c. compare exponential distributions with the same average
d. compare uniform distributions with different minimum and maximum numbers

3.1.3 Skills Practice Exam 3: Chapters 7, 8, 9, & 10[3]

Questions 1, 2, and 3 refer to the following:
In a study of a sample of 35 Computer Science majors and 40 Business majors, the average number of science fiction books each group read per year was recorded. The Computer Science majors read an average of 11 books with a standard deviation of 4 books. The Business majors read an average of 9 books with a standard deviation of 4.5 books. We are interested in whether the average number of science fiction books read by the Computer Science majors is the same as the number read by the Business majors. CS = Computer Science majors B = Business majors

Exercise 3.1.3.1 *(Solution on p. 83.)*
The alternate hypothesis is:

- **a.** mCS = mB
- **b.** mCS ^{1} mB
- **c.** mCS $<$ mB
- **d.** mCS $>$ mB

Exercise 3.1.3.2 *(Solution on p. 83.)*
The exact distribution for the test is:

- **a.** Normal
- **b.** Student-t with df » 72.9775
- **c.** Exponential
- **d.** Uniform

Exercise 3.1.3.3 *(Solution on p. 83.)*
The p-value is

- **a.** 0.0452
- **b.** 2.0376
- **c.** 0.0226
- **d.** 0

Questions 4 and 5 refer to the following:
Suppose that a random survey of 10 teenagers found that the average amount of time they spend on the Internet each day is 3.2 hours with a sample standard deviation of 0.78 hours.

Exercise 3.1.3.4 *(Solution on p. 83.)*
The point estimate of the population average amount of time teenagers spend on the Internet each day is

- **a.** 0.78 hours
- **b.** 32 hours
- **c.** 3.2 hours
- **d.** unknown

Exercise 3.1.3.5 *(Solution on p. 83.)*
An 87% confidence interval for the average amount of time a teenager spends on the Internet each day would be

- **a.** (2.71, 3.68)
- **b.** (2.83, 3.57)

[3]This content is available online at <http://legacy.cnx.org/content/m17620/1.2/>.

c. (2.64, 3.76)
d. (2.79, 3.61)

Exercise 3.1.3.6 *(Solution on p. 83.)*
Which of the following is TRUE about a 99% confidence interval for the true average amount of time that teenagers spend on the Internet each day?

I. We are 99% confident that the true average time that teenagers spend on the Internet per day lies within the confidence interval.
II. The confidence interval contains 99% of the data values collected.
III. 99% of all the confidence intervals constructed this way contain the true average amount of time teenagers spend on the Internet each day.

a. I, II, and III
b. I and II
c. I and III
d. I only

Questions 7 and 8 refer to the following:
Suppose a random survey of 600 registered voters revealed that only 39% actually voted in the last primary election. We are interested in the population proportion of registered voters who actually voted in the last primary election.

Exercise 3.1.3.7 *(Solution on p. 83.)*
The margin of error (error bound) for a 92% confidence interval for the true proportion of registered voters who actually voted in the last primary election is

a - 0.0176
b - 0.3900
c - 0.3551
d - 0.0349

Exercise 3.1.3.8 *(Solution on p. 83.)*
Suppose you want to redo the survey of registered voters to see how many voted in the last election but this time you survey 1000 registered voters and find 340 voted in the last election. If the confidence level is maintained at 92% what happens to the confidence interval.

a. The confidence interval gets wider.
b. The confidence interval gets narrower.
c. The confidence interval stays the same.
d. The confidence interval cannot be calculated.

Exercise 3.1.3.9 *(Solution on p. 83.)*
A study of a certain brand of AA batteries yielded a sample mean lifetime of 450 minutes with a sample standard deviation of 92 minutes. A hypothesis test was performed using the following hypotheses:

H_o : m = 480

H_a : m $<$ 480

The type I error for this hypothesis test is:

a. to conclude that the average battery lifetime is less than 480 minutes when, in reality, it is equal to 480 minutes
b. to conclude that the average battery lifetime is equal to 480 minutes when, in reality, it actually is equal to 480 minutes
c. to conclude that the average battery lifetime is equal to 480 minutes when, in reality, it is less than 480 minutes
d. to conclude that the average battery lifetime is greater than 480 minutes when, in reality, it is equal to 480 minutes

Exercise 3.1.3.10 ***(Solution on p. 83.)***

The null hypothesis is "the percentage of men who score 45 points or more (out of 50 points) on a statistics test at De Anza College is the same as the percentage of women who score 45 points or more." The alternate hypothesis is "the percentage of men who score 45 points or more (out of a 50 point test) on a statistics test at De Anza College is more than the percentage of women who score 45 points or more."

The appropriate hypothesis test to perform and distribution to use is

a. a test of two population proportions, independent groups; Student-t distribution
b. a test of a single population proportion; Normal distribution
c. a test of two population means, independent groups; Normal distribution
d. a test of two population proportions, independent groups; Normal distribution

Questions 11 through 13 refer to the following: In a study of vehicle safety, 15 minivans were crash tested and the repair costs for each of the 15 minivans were recorded. For these 15 minivans, the average repair cost was \$1786 and the standard deviation was \$937 (based on data from the Highway Loss Data Institute.) Suppose that you want to test the hypothesis that the average repair cost is under \$2000. Assume that the underlying population of repair costs follows a normal distribution.

Exercise 3.1.3.11 ***(Solution on p. 83.)***

The correct null hypothesis for this test is

a. m ^{3} 1786
b. m £ 2000
c. m ^{3} 2000
d. m $<$ 2000

Exercise 3.1.3.12 ***(Solution on p. 84.)***

At a 5% level of significance (a), the correct decision for this hypothesis test is

a. reject H_o because a is more than the p-value.
b. reject H_o because a is less than the p-value.
c. do not reject H_o because a is more than the p-value.
d. do not reject H_o because a is less than the p-value.

Exercise 3.1.3.13 ***(Solution on p. 84.)***

The appropriate distribution for this test is

a. Normal with standard deviation \$937
b. t with degrees of freedom = 15
c. t with degrees of freedom = 14
d. Normal with standard deviation \$241.93

For problems 14 and 15: Buses on a particular route stop in front of De Anza College every 20 minutes between 3:00 p.m. and 1:00 a.m. The waiting times are equally likely. We asked the 33 people waiting at 6:45 p.m. how long they had been waiting, and then calculated the average wait time for those people.

Exercise 3.1.3.14 *(Solution on p. 84.)*

The distribution of the average wait times is:

a. N(10 , 1. 0050)
b. U(0 , 20)
c. N(10 , 5.7735)
d. Exp (1 20)

Exercise 3.1.3.15 *(Solution on p. 84.)*

The probability that the average wait time is no more than 15 minutes is

a. 1
b. 0. 7500
c. 0. 7769
d. 0

Exercise 3.1.3.16 *(Solution on p. 84.)*

Which probability statement best describes the graph? The horizontal axis has the label Xbar.

a. P(Xbar $>$ 6)
b. P(Xbar $<$ 3)
c. P(Xbar $>$ 6 or X $<$ 3)
d. P(3 $<$ Xbar $<$ 6)

Questions 17 and 18 refer to the following: A radio news story claimed that half of all U.S. adults have Internet access. In a national poll about Internet usage (The Pew Internet Project), 12,638 U.S. adults were surveyed and it was found that 6413 of those surveyed had Internet access. At a 5% level of significance, perform a hypothesis test to test the claim made by the radio news story.

Exercise 3.1.3.17 *(Solution on p. 84.)*

The hypothesis test is:

a. right - tailed
b. left - tailed
c. two – tailed
d. no-tailed

Exercise 3.1.3.18 *(Solution on p. 84.)*

The correct conclusion is:

a. The percentage of U.S. adults that have Internet access is not one-half.
b. more than half of all U.S. adults have Internet access.
c. half of all U.S. adults have Internet access.
d. less than half of all U.S. adults have Internet access.

Questions 19 - 21 refer to the following: An organic fertilizer and a conventional chemical fertilizer are tested to determine if the organic fertilizer produces more blossoms per stalk. 43 pairs of seed (the pair of seeds come from the same parent plant) are treated. One seed is treated with the organic fertilizer and the other seed is treated with the conventional chemical fertilizer. After a growing season of identical watering and sunlight, the number of blossoms on each stalk in a matched pair is recorded. For each pair, the

difference in the number of blossoms per stalk (organic fertilizer plant blossoms – conventional chemical fertilizer plant blossoms) is computed. _ The statistics are: xd = 2.2 sd = 5.3 n = 43

Exercise 3.1.3.19 ***(Solution on p. 84.)***

What type of hypothesis test is conducted?

a. Test of a single population mean
b. Test of two population proportions, independent groups
c. Matched or Paired Samples
d. Test of two population means, independent groups

Exercise 3.1.3.20 ***(Solution on p. 84.)***

Select the appropriate alternate hypothesis.

a. μd £ 0
b. μd $>$ 0
c. μd $>$ 2.2
d. μd £ 2.2

Exercise 3.1.3.21 ***(Solution on p. 84.)***

What is the correct conclusion?

a. The organic fertilizer does result in more blossoms per stalk
b. The organic fertilizer does not result in more blossoms per stalk.
c. The organic fertilizer results in the same number of blossoms per stalk
d. The conventional chemical fertilizer does result in more blossoms per stalk

Problems 22 – 24 refer to the following: Based on data from the 2000 Census the average age of a Baldwin County, Alabama resident is 39 years with a standard deviation of 22. 6 . The data is normally distributed.

Exercise 3.1.3.22 ***(Solution on p. 84.)***

The median age, in years, is:

a. 39
b. 22.6
c. 19.5
d.. There is not enough information.

Exercise 3.1.3.23 ***(Solution on p. 84.)***

If 100 residents are surveyed, the IQR for the average age is:

a. 0. 30
b. 30.5
c. 3.04
d.. There is not enough information.

Questions 24 – 25 refer to the following: Students doing a statistics project at Central City College found that the amount of time a teenager spends cleaning his/her room each week is exponentially distributed with a mean of 20 minutes.

Exercise 3.1.3.24 ***(Solution on p. 84.)***

What is the probability that 50 randomly selected teenagers spend, on average, between 15 and 30 minutes cleaning their rooms each week?

a. 0.7500
b. 0.2902
c. 0.2492

d. 0.9612

Exercise 3.1.3.25 *(Solution on p. 84.)*

Find the 70th percentile for the average amount of time 50 teenagers spend cleaning their rooms each week.

a. 70
b. 21.5
c. 30.5
d. 7.1

3.2 Practice Final Exams

3.2.1 Exam 1: Chapters 1 & 2[4]

Questions 1 – 2 refer to the following:
A sample of 56 employees was taken to determine average pulse rate. The data is in the table below:

Pulse Rate (beats per minute)	Frequency (# of employees)
54	1
58	4
65	7
68	9
72	10
76	4
80	10
84	6
90	3
98	2

Table 3.8

Exercise 3.2.1.1 ***(Solution on p. 84.)***
The mode(s) is/are:

A. 74
B. 72 and 80
C. 68
D. the average of 72 and 80

Exercise 3.2.1.2 ***(Solution on p. 84.)***
The variable is:

A. the number of employees
B. all employees
C. the average pulse rate for the 56 employees
D. the pulse rate of one employee

Questions 3 – 5 refer to the following:
The table below shows the ages of 50 senior citizens who attend a local senior center.

[4]This content is available online at <http://legacy.cnx.org/content/m17600/1.2/>.

Age	Frequency	Relative Freq.	Cum. Rel. Freq.
56	9	0.18	
63	8		
68	17	0.36	
73	8	0.16	
80	5	0.10	
88	2	0.04	1.00

Table 3.9

Exercise 3.2.1.3 *(Solution on p. 84.)*
Find the IQR.

A. 0.5
B. 17
C. 10
D. not enough information

Exercise 3.2.1.4 *(Solution on p. 84.)*
Which interval has the smallest percentage of data?

A. The interval 55.5 to 63.5.
B. The interval 63.5 to 68.5.
C. The interval 68.5 to 73.5.
D. The interval 73.5 to 88.5.

Exercise 3.2.1.5 *(Solution on p. 84.)*
What percent of the ages are at most 68?

A. 36
B. 70
C. 30
D. 66

Exercise 3.2.1.6 *(Solution on p. 84.)*
What can be said about a set of data when its standard deviation is zero?

A. If the data are ordered, they are very spread out from the mean.
B. All of the data appear with the same frequency.
C. If the data are ordered, they are very close to but different from the mean.
D. There is no mode.

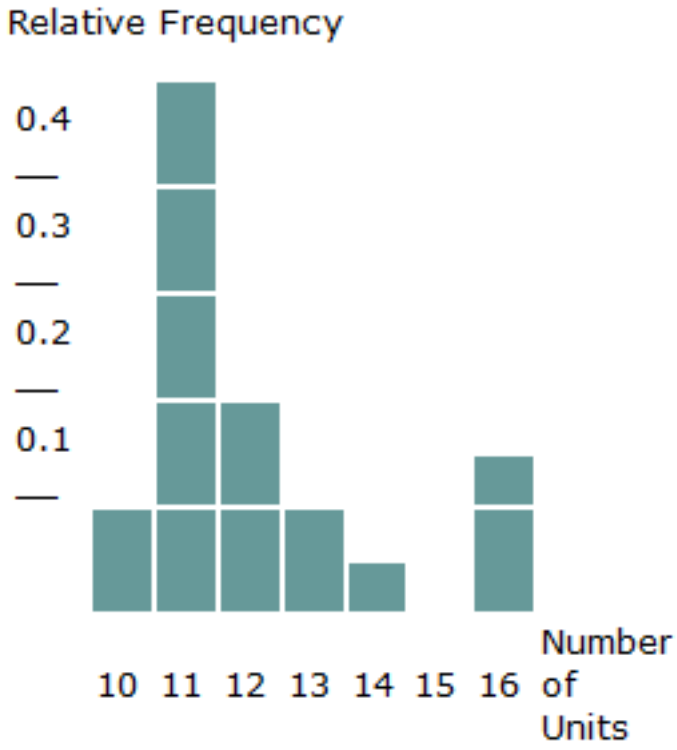
Exercise 3.2.1.7 *(Solution on p. 84.)*
For the following data, which measure of central tendency would be the LEAST useful? Data:

4; 8; 11; 11; 11; 27; 27; 27; 27; 27; 1000

A. mean
B. median
C. mode

D. standard deviation

Questions 8 – 10 refer to the following:
Sixty (60) college students were asked the number of units they are taking this quarter. The results are given in the following graph:



Exercise 3.2.1.8 *(Solution on p. 84.)*
The number of responses that were "12" OR "13" is approximately:

A. 18
B. 0.3
C. 25
D. Not enough information

Exercise 3.2.1.9 *(Solution on p. 84.)*
The third quartile is:

A. 15
B. 14
C. 13
D. 12

# of Videos	Frequency	Relative Frequency	Cum. Rel. Freq.
0	18	0.29	?
1	26	0.41	?
2	?	?	?
3	6	?	?
4	1	?	?

Table 3.10

Exercise 3.2.1.10 ***(Solution on p. 84.)***
The sample from the table above was taken by randomly selecting one student from the administration's official list of students and then choosing every 100th. This is an example of what kind of sampling?

A. cluster
B. systematic
C. stratified
D. convenience

Exercise 3.2.1.11 ***(Solution on p. 84.)***
How should you classify data from the following question: What is your blood pressure?

A. qualitative
B. quantitative – discrete
C. quantitative – continuous

Exercise 3.2.1.12 ***(Solution on p. 85.)***
How should you classify data from the following question: What is your favorite vacation place?

A. qualitative
B. quantitative – discrete
C. quantitative – continuous

Exercise 3.2.1.13 ***(Solution on p. 85.)***
A study is done to determine the average amount of tuition all San Jose State undergraduate students pay per semester. A sample of 100 undergraduate San Jose State students is taken by dividing the students into freshmen, sophomore, junior, and senior years and selecting 25 students from each. Each student is asked how much tuition he/she paid for the Spring 2002 semester. The type of sampling and the parameter are:

A. cluster and the average amount of tuition all San Jose State students paid Spring 2002.
B. stratified and the average amount of tuition the 100 San Jose State students paid Spring 2002.
C. cluster and the average amount of tuition the 100 San Jose State students paid Spring 2002.
D. stratified and the average amount of tuition all San Jose State students paid Spring 2002.

3.2.2 Exam 2: Chapters 3 & 4[5]

Questions 1 – 4 refer to the following:
The following table classified eighty-two children by age and favorite meals at a McDonald's ® restaurant.

Age (in years) against favorite foods

	6 or below	7-12	13-15	Total
Hamburger	6	12	16	34
Chicken Nuggets	9	13	11	33
Filet 'o' fish	2	5	8	15
Totals	17	30	35	82

Table 3.11

Assume a child is randomly selected.

Exercise 3.2.2.1 ***(Solution on p. 85.)***
Find the probability of being "7-12" years old AND preferring "chicken nuggets"

A. $\frac{13}{82}$
B. $\frac{28}{82}$
C. $\frac{33}{82}$
D. $\frac{13}{61}$

Exercise 3.2.2.2 ***(Solution on p. 85.)***
Find the probability of being "13-15" years old OR preferring "Filet'o'fish".

A. $\frac{8}{82}$
B. $\frac{50}{82}$
C. $\frac{8}{51}$
D. $\frac{42}{82}$

Exercise 3.2.2.3 ***(Solution on p. 85.)***
Find the probability of "preferring Hamburger" given that the randomly selected child is 13-15 years old.

A. $\frac{16}{82}$
B. $\frac{16}{35}$
C. $\frac{16}{34}$
D. $\frac{16}{70}$

Exercise 3.2.2.4 ***(Solution on p. 85.)***
The events "preferring Hamburger" and "being 13-15 years old" are:

A. Mutually exclusive
B. Independent
C. Neither mutually exclusive or independent.
D. Both mutually exclusive and independent.

[5]This content is available online at <http://legacy.cnx.org/content/m17613/1.2/>.

Exercise 3.2.2.5 *(Solution on p. 85.)*
E and F are two events such that $P(E) = 0.60$, $P(E \text{ or } F = 0.90$ and $P(E \text{ and } F = 0.50$. Find $P(F)$.

A. 0.80
B. 0.30
C. 0.40
D. 0.10

Exercise 3.2.2.6 *(Solution on p. 85.)*
The probability that a randomly chosen adult resident of Bayview city owns a boat is 0.16. The probability that a randomly chosen adult rents an apartment is 0.30. The probability that the adult owns a boat given he/she rents an apartment is 0.20.

A. 0.048
B. 0.24
C. 0.10
D. 0.06

Exercise 3.2.2.7 *(Solution on p. 85.)*
Possessing a boat and renting an apartment are:

A. independent events
B. mutually exclusive
C. both independent and mutually exclusive
D. neither independent nor mutually exclusive

Questions 8 – 9 refer to the following:
A bag contains 4 red marbles and 5 blue marbles. Two marbles are randomly drawn without replacement.

Exercise 3.2.2.8 *(Solution on p. 85.)*
Find the probability of the event "The first marble is red and the second is blue."

A. $\frac{20}{81}$
B. $\frac{20}{72}$
C. $\frac{4}{12}$
D. $\frac{4}{9}$

Exercise 3.2.2.9 *(Solution on p. 85.)*
Find the probability that both marbles are red.

A. $\frac{16}{81}$
B. $\frac{7}{81}$
C. $\frac{12}{72}$
D. $\frac{8}{72}$

Exercise 3.2.2.10 *(Solution on p. 85.)*
Approximately 70% of U. S. adults had at least one pet as a child. We randomly survey 60 U. S. adults. We are interested in the number that had at least one pet as a child. The probability that at least 3 adults had at least one pet as a child means:

A. $P(X = 0) + P(X = 1) + P(X = 2)$

B. $P(X=0)+P(X=1)+P(X=2)+P(X=3)$
C. $P(X=4)+P(X=5)+P(X=6)+...+P(X=60)$
D. $P(X=3)+P(X=4)+P(X=5)+...+P(X=60)$

Questions 11 – 12 refer to the following:
A plumber has determined the possible number of house calls to be made each day, and their related probabilities:

x =**# of house calls**	$P(x)$	
0	0.10	
1	0.40	
2	0.25	
3	0.15	
4	0.10	

Table 3.12

Exercise 3.2.2.11 ***(Solution on p. 85.)***
What is the probability that he makes at least 1, but no more than 3 house calls in a day?

A. 0.65
B. 0.80
C. 0.50
D. 0.40

Exercise 3.2.2.12 ***(Solution on p. 85.)***
If the plumber charges a flat fee of $ 40 for a house call, the expected daily income is:

A. $70
B. $175
C. $400
D. $1.75

Exercise 3.2.2.13 ***(Solution on p. 85.)***
If $X \sim B(40, 0.2)$, then $P(X > 11) =$

A. 0.0432
B. 0.0001
C. 0.0875
D. 0.1608

Exercise 3.2.2.14 ***(Solution on p. 85.)***
The Fizz–Full Soda Company knows that 4% of the bottles of soda it produces are filled with less soda than required. If one purchases 10 bottles at random, the probability that at most 2 of these bottles will have less soda than required is:

A. 0.0519
B. 0.9938
C. 0.9418
D. 0.0080

Questions 15 – 16 refer to the following:
Assume the statistics final is a multiple-choice exam with 50 questions, each question having 5 choices, only one of which is correct. Assume you answer all questions at random (guessing).

Exercise 3.2.2.15 *(Solution on p. 85.)*
The expected number of questions you would get correct would be:

A. 5
B. 10
C. 40
D. 45

Exercise 3.2.2.16 *(Solution on p. 85.)*
Based upon numerical calculations, would you be surprised if a person got exactly half of the questions correct?

A. yes, because it is impossible
B. yes, because the probability is almost 0
C. no, because the probability is 0.50
D. no, because it is the most likely probability

Exercise 3.2.2.17 *(Solution on p. 85.)*
If sampling without replacement occurs, do the picks follow the Binomial Distribution?

A. Yes, because each pick is independent from the others.
B. No, because the probability of success on each pick changes.
C. Yes, if we are counting the number of successes.
D. No, because we may not have any successes.

Exercise 3.2.2.18 *(Solution on p. 85.)*
Ninety-four percent of California community college transfers feel that their community college adequately prepared them to handle upper-division coursework at their transfer university. We randomly survey 14 California community college transfers. We are interested in the number that feel that their community college adequately prepared them to handle upper division coursework at their transfer university. List the values that X , the Random Variable, may take on.

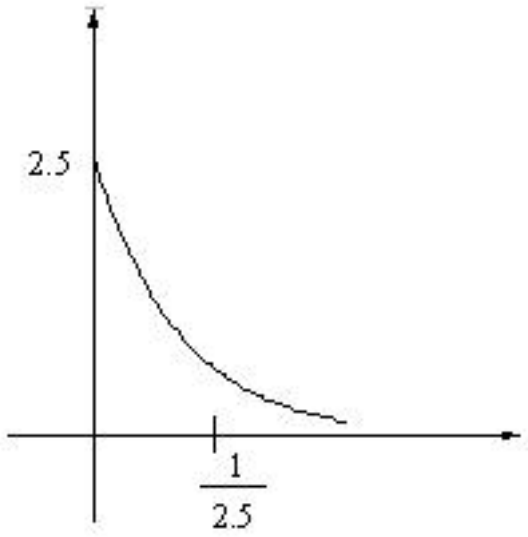
A. $1, 2, 3, ..., 14$
B. $1, 2, 3, ..., 94$
C. $0, 1, 2, ..., 14$
D. $0, 1, 2, ..., 94$

3.2.3 Exam 3: Chapters 5, 6, & 7[6]

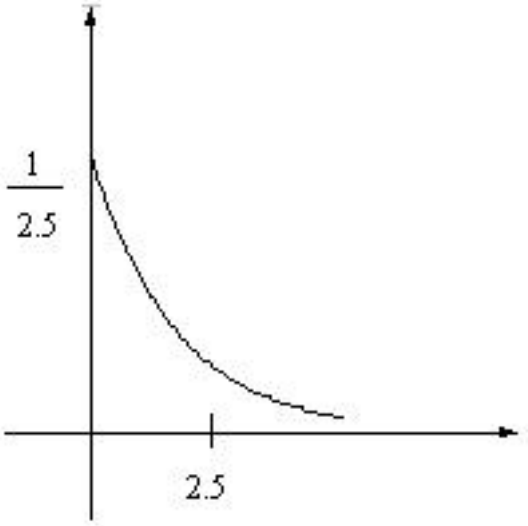
Questions 1 – 3 refer to the following:
Assume the amount of money seventh–grade students spend on food each day at school is exponentially distributed with an average of $2.50.

Exercise 3.2.3.1 *(Solution on p. 85.)*
Which graph best describes the distribution?

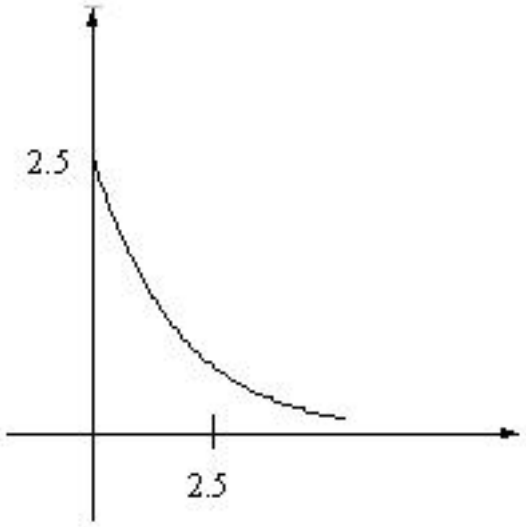
[6]This content is available online at <http://legacy.cnx.org/content/m17614/1.2/>.



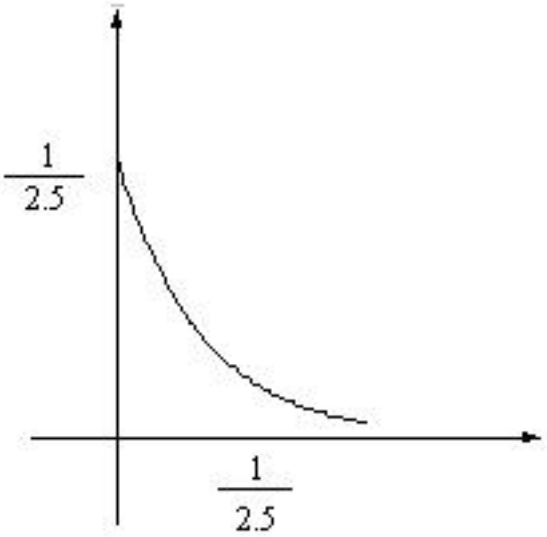
A.



B.



C.



D.

Exercise 3.2.3.2 ***(Solution on p. 85.)***

Find the probability that a randomly selected seventh–grade student spends less than \$4 a day on food.

A. 0.7981
B. 0.2019
C. 0.9999
D. 0.0001

Exercise 3.2.3.3 ***(Solution on p. 85.)***

85% of the seventh–grade students spend more than what amount per day?

A. \$2.12
B. \$0.75
C. \$4.74

D. $0.41

Questions 4 – 5 refer to the following:
The amount of time that intermediate algebra students at Leland High School spend doing their homework per day is normally distributed with a mean 1.5 hours and standard deviation 0.75 hours.

Exercise 3.2.3.4 *(Solution on p. 85.)*
If one student is randomly chosen, what is the probability that the student does intermediate algebra homework at least 2 hours per day?

A. 0.7475
B. 0.4259
C. 0.2525
D. 0.6784

Exercise 3.2.3.5 *(Solution on p. 85.)*
60% of these students spend at most how many hours doing their homework?

A. 1.69 hours
B. 1.31 hours
C. 1.5 hours
D. 0.2533 hours

Questions 6 – 7 refer to the following:
Llamas are excellent pack animals. It is known that the weight of supplies carried by llamas follows a normal distribution with a mean of 62.5 pounds and a standard deviation of 6 pounds.

Exercise 3.2.3.6 *(Solution on p. 86.)*
Find the probability that the weight of supplies carried by one randomly chosen llama is between 60 and 70 pounds.

A. 0.4441
B. 0.5559
C. 0.8944
D. 1

Exercise 3.2.3.7 *(Solution on p. 86.)*
The middle 50% of weights of supplies carried by a randomly chosen llama is between _____ and _____.

A. 0 and 62.5 pounds
B. 58.45 and 66.55 pounds
C. 56.5 and 68.5 pounds
D. There is not enough information given.

Exercise 3.2.3.8 *(Solution on p. 86.)*
Which of the following are true for the normal distribution?

I. More values fall close to the mean than fall far away from the mean.
II. The mean and standard deviation cannot be the same.
III. A change in μ causes the graph to shift to the left or right and changes the shape of the graph.
IV. A change in s causes a change in the shape of the normal curve.

A. I, IV
B. I, II, III, IV
C. I, II, III
D. III, IV

Questions 9 – 13 refer to the following:
The length of time junior high school students sleep per night follows an approximate uniform distribution from seven to eleven hours. Suppose we randomly select a junior high student.

Exercise 3.2.3.9 *(Solution on p. 86.)*
Find the probability that the randomly selected student sleeps less than 8 1/2 hours per night.

A. .2143
B. 0.7727
C. 0.4705
D. 0.375

Exercise 3.2.3.10 *(Solution on p. 86.)*
Find the probability that the randomly selected student sleeps eight to twelve hours per night.

A. 0
B. 1
C. 0.75
D. 0.25

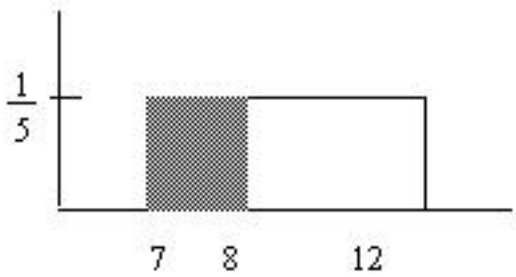
Exercise 3.2.3.11 *(Solution on p. 86.)*
On average, how long does a junior high school student sleep per night?

A. .2143
B. 0.7727
C. 0.4705
D. 0.375

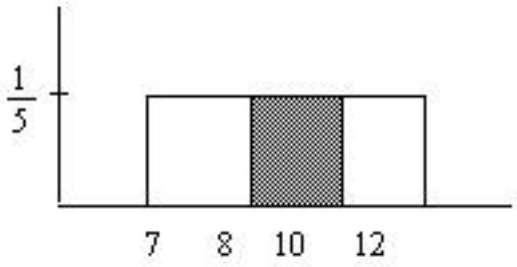
Exercise 3.2.3.12 *(Solution on p. 86.)*
On average, how long does a junior high school student sleep per night?

A. 9.6 hours
B. 6.5 hours
C. 7.8 hours
D. 8.4 hours

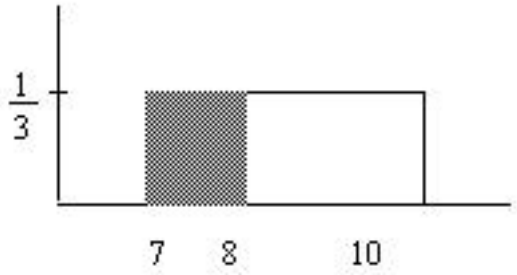
Exercise 3.2.3.13 *(Solution on p. 86.)*
We are interested in the probability that a randomly selected student sleeps less than eight hours, knowing that he/she sleeps less than ten. Which graph best depicts this situation?



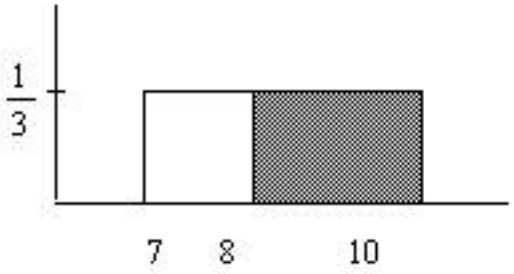
A.



B.



C.



D.

3.2.4 Exam 4: Chapters 8, 9, & 10[7]

- Each question has exactly one best answer.
- Each question is worth 3 points for a total of 54 points (4 bonus points possible).

Questions 1 – 3 refer to the following:
Last year, President Bush granted a tax-cut check to all income tax filers. In doing so, it was reported that he thought that at least 30% of the households would use the tax-cut check to increase spending. According to a report by the University of Michigan Research Center (Wall Street Journal, Feb. 26, 2002), 220 of the 1000 people surveyed said that the 2001 tax-cut check they received has led them to increase spending.

Exercise 3.2.4.1 ***(Solution on p. 86.)***

The alternate hypothesis for this test is:

A. $p>0.30$
B. $p>0.22$
C. $p>0.30$

[7]This content is available online at <http://legacy.cnx.org/content/m17616/1.2/>.

D. $p>0.22$

Exercise 3.2.4.2 *(Solution on p. 86.)*
A Type II error is to:

A. Conclude that the proportion of people that would use the tax-cut check to increase spending is less than 30% when in fact the proportion is at least 30%.
B. Conclude that the proportion of people that would use the tax-cut check to increase spending is at least 30% when in fact the proportion is less than 30%.
C. Conclude that the proportion of people that would use the tax-cut check to increase spending is less than 22% when in fact the proportion is at least 22%.
D. Conclude that the proportion of people that would use the tax-cut check to increase spending is at least 22% when in fact the proportion is less than 22%.

Exercise 3.2.4.3 *(Solution on p. 86.)*
Which of the following is the correct decision to make for the test?

A. Reject the null hypothesis.
B. Do not reject the null hypothesis.
C. The test is inconclusive.

Questions 4 – 6 refer to the following:
According to an article by George Will (San Jose Mercury News, Feb. 28, 2002), the average U.S. consumption per person per year of French Fries is 28 pounds. Suppose that you believe that the average in Santa Clara County is not 28 pounds. You randomly survey 50 people in this county. The sample average is 24 pounds with a sample standard deviation of 10 pounds. Conduct an appropriate hypothesis test.

Exercise 3.2.4.4 *(Solution on p. 86.)*
This test is:

A. left-tailed
B. right-tailed
C. two-tailed
D. no-tailed

Exercise 3.2.4.5 *(Solution on p. 86.)*
The p-value for this test is:

A. 0.0068
B. 0.0034
C. 0.0047
D. 0.0136

Exercise 3.2.4.6 *(Solution on p. 86.)*
At the 5% level, the correct conclusion is:

A. The average consumption in Santa Clara County is less than 28 pounds.
B. The average consumption in Santa Clara County is not 28 pounds.
C. The average consumption in Santa Clara County is less than 24 pounds.
D. The average consumption in Santa Clara County is 24 pounds.

Questions 7 and 8 refer to the following:
A hospital administrator wants to determine the proportion of emergency room patients that use the emergency room (ER) for non-emergency care. She randomly samples records from 350 ER patients and determines that 74 of those patients required only non-emergency care.

Exercise 3.2.4.7 *(Solution on p. 86.)*
The administrator constructs a 90% confidence interval for the true proportion of all ER patients who use the ER for non-emergency care. The error bound for the proportion EBP for this confidence interval is:

A. 0.036
B. 0.072
C. 0.030
D. 0.106

Exercise 3.2.4.8 *(Solution on p. 86.)*
If the same data were used but the confidence level used was 95% instead of 90%, the error bound for the proportion EBP would be:

A. larger
B. the same
C. smaller
D. we are unable to determine unless another sample is obtained

Exercise 3.2.4.9 *(Solution on p. 86.)*
What is meant by the term "95% confident" when constructing a confidence interval for a mean?

A. If we took repeated samples, approximately 95% of the samples would produce the same confidence interval.
B. If we took repeated samples, approximately 95% of the confidence intervals calculated from those samples would contain the sample mean.
C. If we took repeated samples, the sample mean would equal the population mean in approximately 95% of the samples.
D. If we took repeated samples, approximately 95% of the confidence intervals calculated from those samples would contain the true value of the population mean.

Questions 10 through 11 refer to the following:
An aircraft manufacturer is testing a new procedure to be used in installing a certain component in an aircraft. For a random sample of 8 airplanes being assembled, the time (in minutes) required to install the component for each of these 8 aircrafts are:

80; 84; 87; 91; 91; 95; 102; 106

Assume the underlying population of installation times is approximately normally distributed.

Exercise 3.2.4.10 *(Solution on p. 86.)*
Find the 90% confidence interval for the true mean installation time using this new procedure.

A. (86.1, 97.9)
B. (86.9, 91.1)
C. (87.2, 96.8)
D. Not enough information

Exercise 3.2.4.11 *(Solution on p. 86.)*
The value that is the center of the confidence interval is:

A. 91
B. 92
C. 93
D. μ

Exercise 3.2.4.12 *(Solution on p. 86.)*
The amount of soda contained in a can for a certain brand of soda is normally distributed with a population standard deviation of 0.1 ounces. A random sample of 40 cans of soda was selected and the amount of soda in each can was measured. The sample mean was 12.03 ounces and the sample standard deviation was 0.08 ounces.

What is the appropriate distribution to use when calculating a confidence interval for the true mean amount of soda contained in all cans of this brand?

A. The student-t distribution, because the sample standard deviation is given.
B. The student-t distribution, because the repair costs are approximately normally distributed.
C. The standard normal distribution, because the population standard deviation is known.
D. The standard normal distribution, because the sample mean is known.

Questions 13 – 15 refer to the following:
Two competing parcel-delivery firms in a large city make conflicting claims about which one delivers parcels in the shortest time. A random sample of 100 delivery times for the first company produces a sample mean of x1 = 37 minutes and a sample standard deviation of s1 = 10 minutes. A random sample of 100 delivery times for the second company produces a sample mean of x2 = 41 minutes and a sample standard deviation of s2 = 12 minutes. Conduct a hypothesis test to determine if the mean delivery time for the first company is less than that for the second company.

Exercise 3.2.4.13 *(Solution on p. 86.)*
What is the appropriate distribution to use when calculating a confidence interval for the true mean amount of soda contained in all cans of this brand?

A. m1 $<$ m2
B. m1 $>$ m2
C. m1 £ m2
D. m1 ^{3} m2

Exercise 3.2.4.14 *(Solution on p. 86.)*
The exact distribution for the hypothesis test is:

A. The normal distribution because the population standard deviations are given.
B. The student-t distribution because the population standard deviations are unknown.
C. The exponential distribution because the time of delivery decreases.
D. Not able to determine.

Exercise 3.2.4.15 *(Solution on p. 86.)*
f the p-value is 0.0056, the conclusion is:

A. The mean delivery time for the first company is higher than the mean delivery time for the second company.
B. The mean delivery time for the first company is no more than the mean delivery time for the second company.
C. The mean delivery time for the first company is at least equal to the mean delivery time for the second company.

D. The mean delivery time for the first company is less than the mean delivery time for the second company.

Questions 16 – 17 refer to the following:
Participants in a random sample of 10 professional football players are placed on a yogurt-and-banana diet for one month. The weights before and after one month on the diet are as follow:

Before	187	205	165	193	199	286	212	189	242	253
After	175	193	167	190	197	240	210	189	221	255

Table 3.13

We want to determine if the yogurt-and-banana diet helps reduce the weight of the football players. Assume the weight of the professional football players is approximately normally distributed.

Exercise 3.2.4.16 ***(Solution on p. 86.)***
This is a test of:

A. Two independent population means, population standard deviations known.
B. Two independent population means, population standard deviations unknown.
C. Paired or matched samples.
D. Two population proportions.

Exercise 3.2.4.17 ***(Solution on p. 86.)***
The distribution for the hypothesis test is:

A. Student-t
B. Exponential
C. Normal
D. Uniform

Exercise 3.2.4.18 ***(Solution on p. 87.)***
A newspaper/TV network survey was conducted to determine whether the percentage of adult males who favor the death penalty is greater than the percentage of adult females who favor the death penalty. A random sample of 800 adult males produced 480 who favor the death penalty., while a random sample of 800 adult females produced 410 who favor the death penalty.

The Type I error is to:

A. Conclude that the percentage of adult males who favor the death penalty is greater than the percentage of adult females who favor the death penalty when, in fact, the percentage of males is no more than the percentage of females.
B. Conclude that the percentage of adult males who favor the death penalty is no more than the percentage of adult females who favor the death penalty when, in fact, the percentage of males is more than the percentage of females.
C. Conclude that the percentage of adult males who favor the death penalty is greater than the percentage of adult females who favor the death penalty when, in fact, the percentage of males is actually greater than the percentage of females.
D. Conclude that the percentage of adult males who favor the death penalty is no more than the percentage of adult females who favor the death penalty when, in fact, the percentage of males is actually no more than the percentage of females.

3.2.5 Exam 5: Chapter 11[8]

Exercise 3.2.5.1 *(Solution on p. 87.)*
Suppose the random variable X follows a chi-square distribution with degrees of freedom equal to 35. Fill in the blanks.

A. $m =$
B. $s =$

Exercise 3.2.5.2 *(Solution on p. 87.)*
Check all that apply.

A. The chi-square graph always has the same shape.
B. If X follows a chi-square distribution with df = 200, then X approximately follows a normal distribution.
C. The chi-square distribution is skewed to the right if the degrees of freedom are less than 90.
D. The test statistic for the chi-square distribution may be zero.
E. A goodness-of-fit hypothesis test is always right-tailed.
F. A test of independence tests whether two factors are independent or not.

Exercise 3.2.5.3 *(Solution on p. 87.)*
Write the null and alternate hypotheses for the following:

It is believed that public high school students attend school in equal numbers for each day of the school week. Suppose a sample of the days students were present at school was taken for one particular high school:

- 1750 students were present on Monday
- 1800 students were present on Tuesday
- 1840 students were present on Wednesday
- 1810 students were present on Thursday
- 1800 students were present on Friday

Ho:

Ha:

3.2.6 Exam 6: Chapter 12[9]

Questions 1 – 3 refer to the following:
New snowboarders (those who have snowboarded a year or less) often suffer from minor injuries. A random sample of seven new snowboarders produced the data on number of months snowboarding and number of minor injuries in the last month that they snowboarded.

[8]This content is available online at <http://legacy.cnx.org/content/m17615/1.2/>.
[9]This content is available online at <http://legacy.cnx.org/content/m17617/1.3/>.

Months Snowboarding	# of injuries in the last month
2	9
4	6
8	3
12	2
1	9
5	6
9	2

Table 3.14

Exercise 3.2.6.1 ***(Solution on p. 87.)***
Is the correlation between the number of months snowboarding and the number of injuries in the last month snowboarding significant?

A. Yes
B. No
C. Not enough information to answer question

Exercise 3.2.6.2 ***(Solution on p. 87.)***
The linear regression equation is:

A. yhat = 9.5904 – 0.9614 x
B. yhat = -0.7349 + 9.5904x
C. yhat = 9.5904 + 0.7349x
D. yhat = 9.5904 – 0.7349x

Exercise 3.2.6.3 ***(Solution on p. 87.)***
If a new snowboarder has snowboarded for five (5) months, how many injuries would s/he have in the last month snowboarding?

A. 4.8
B. 47.2
C. 5.9
D. 13.3

Exercise 3.2.6.4 ***(Solution on p. 87.)***
If you calculate the line of best fit and the independent variable and the dependent variable have negative correlation, then the line of best fit has slope zero (0).

A. True
B. False
C. There is not enough information

Questions 5 – 6 refer to the following:
The cost of a leading gourmet ice cream in different sizes is given in the table.

Size (ounces)	Cost
16	$4.29
32	$7.36
64	$12.80
96	$17.28

Table 3.15

Exercise 3.2.6.5 *(Solution on p. 87.)*
Are there any outliers?

A. Yes
B. No
C. Not enough information

Exercise 3.2.6.6 *(Solution on p. 87.)*
If your friend used the line of best fit to predict the cost for a 128-ounce size of gourmet ice cream, what would you tell him/her with what you have learned about linear regression?

A. That a line is not the best fit for the cost of the gourmet ice cream.
B. That the 128-ounce size of the gourmet ice cream is far too expensive.
C. That we should switch the independent and dependent variables.
D. That s/he should not use the line of best fit to make this prediction.

3.3 Quizzes

3.3.1 Quiz 1: Sampling and Data[10]

Exercise 3.3.1.1
A study is done to determine the average amount of television watched per week by California children. What is the phrase "average amount of television watched per week by California children" describing?

A. data
B. statistic
C. parameter
D. variable

Exercise 3.3.1.2
How should you classify data from the following: What are the names of colleges you have attended?

A. quantitative - continuous
B. quantitative - discrete
C. qualitative

[10]This content is available online at <http://legacy.cnx.org/content/m17601/1.3/>.

Exercise 3.3.1.3
How should you classify data from the following: What is the number of times during the summer that you go to the beach?

A. quantitative - continuous
B. quantitative - discrete
C. qualitative

Exercise 3.3.1.4
How should you classify data from the following: What is your weight?

A. quantitative - continuous
B. quantitative - discrete
C. qualitative

Exercise 3.3.1.5
A study is done to determine the average salary for all Santa Clara County nurses. If we were to pick the Valley Medical Center, Good Samaritan Hospital, and Saint Louise Hospital in Santa Clara County and average together the salaries of all nurses, would this be a good sampling technique or a bad sampling technique?

Exercise 3.3.1.6
A study is done to determine the average amount of television watched per week by California children. What is the phrase "the average amount of television watched per week by California children in a random survey" describing?

A. sample
B. variable
C. statistic
D. data

Exercise 3.3.1.7
A study is done to determine the average amount of television watched per week by California children. Three of the California children watch two hours, 1 hour, and one-half hour, respectively. "Two hours, 1 hour, and one-half hour" are the:

A. data
B. statistic
C. parameter
D. sample

Exercise 3.3.1.8
Determine the sampling technique: A medical researcher does a random survey of 100 female doctors and 100 male doctors.

A. stratified
B. systematic
C. simple random
D. cluster

Exercise 3.3.1.9
Sixty-three people were asked the number of movies they saw in the movie theaters over their last vacation. Which of the following columns do we **NOT** add up?

A. frequency
B. relative frequency
C. cumulative relative frequency

Exercise 3.3.1.10
Sixty-three people were asked the number of movies they saw in the movie theaters over their last vacation. Twenty-two people saw no movies, fourteen people saw one movie, ten people saw two movies, seven people saw three movies, six people saw four movies, and four people saw 5 or more movies. What percent of people saw 1 or 2 movies?

A. about 19%
B. about 38%
C. about 60%
D. about 89%

3.3.2 Quiz 2: Descriptive Statistics[11]

Exercise 3.3.2.1
The following table shows the lengths of 64 international phone calls using a $5 prepaid calling card.

Frequency of Phone Call Lengths

Data (minutes)	Frequency	Relative Frequency	Cumulative Relative Frequency
4	25	0.3906	
14	15		
24	10	0.1563	
34	9	0.1406	
44	4	0.0625	
54	1	0.0156	1.0000

Table 3.16

Using the data, determine which **ONE** of the answers is correct:

A. The mean and the median are equal.
B. The mean is smaller than the median.
C. The mean is larger than the median.

Exercise 3.3.2.2
Interpret the following box plot:

[11] This content is available online at <http://legacy.cnx.org/content/m16311/1.6/>.

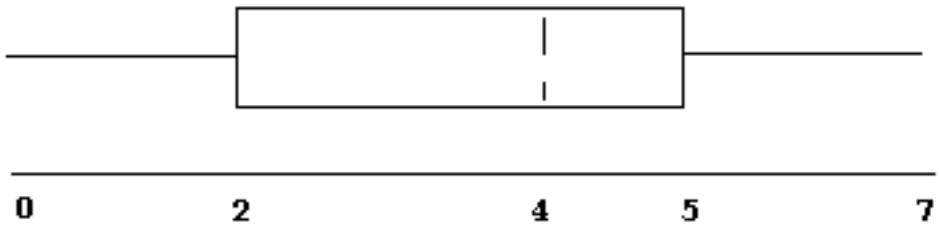


Figure 3.1

Which of the following is correct?

A. 75% of the data are at most 5.
B. There is about the same amount of data from 2-5 as there is from 5-7.
C. There are no data values of 3.
D. 50% of the data are 4.

Exercise 3.3.2.3
In a set of data, if all of the data appear with the same frequency, then:

A. The standard deviation is always 0.
B. The mean is always larger than the standard deviation.
C. All of the data have the same value.
D. The boxplot does not always look symmetrical.

Exercise 3.3.2.4
The following table shows the lengths of 64 international phone calls using a $5 prepaid calling card.

Frequency of Phone Call Lengths

Data (minutes)	Frequency	Relative Frequency	Cumulative Relative Frequency
4	25	0.3906	
14	15		
24	10	0.1563	
34	9	0.1406	
44	4	0.0625	
54	1	0.0156	1.0000

Table 3.17

Find the 60th percentile.

A. 14
B. 60

C. 15
D. 0.2344

Exercise 3.3.2.5
Consider the following data set:

4; 6; 6; 12; 18; 18; 18; 200

What value is 2 standard deviations above the mean?

A. There is not enough information
B. Approximately -98
C. Approximately 102
D. Approximately 169

Exercise 3.3.2.6
Consider the following data:

14; 16; 16; 22; 25; 38; 38; 38; 38; 2000

Which of the measures of central tendency would be the **least** useful?

A. mean
B. mode
C. median

Exercise 3.3.2.7
The following table shows the lengths of 64 international phone calls using a $5 prepaid calling card.

Frequency of Phone Call Lengths

Data (minutes)	Frequency	Relative Frequency	Cumulative Relative Frequency
4	25	0.3906	
14	15		
24	10	0.1563	
34	9	0.1406	
44	4	0.0625	
54	1	0.0156	1.0000

Table 3.18

What percent of the data is either 34 or 44 minutes?

A. Approximately 78%
B. Approximately 13%
C. Approximately 98%
D. Approximately 20%

Questions 8 – 10 refer to the following:
Sixty-four faculty members were asked the number of cars they owned (including spouse's and children's cars). The results are given in the histogram below:

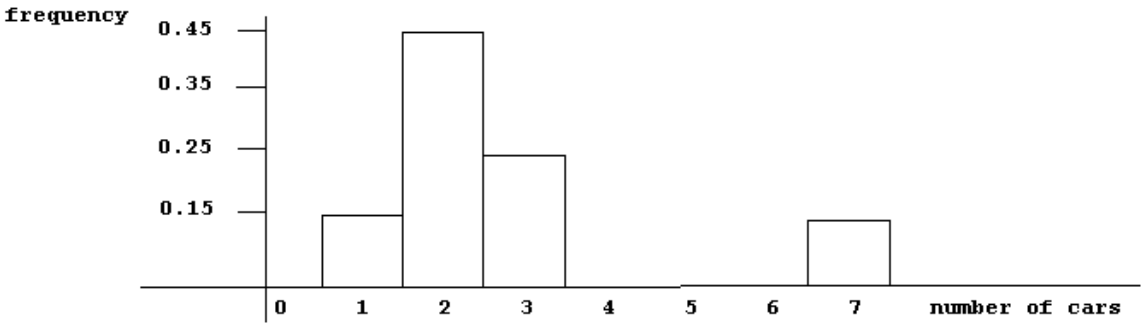


Figure 3.2

Exercise 3.3.2.8
The number of responses that were either "1" or "3" is approximately:

A. 0.4
B. 27
C. 40
D. 2

Exercise 3.3.2.9
Which of the following **DOES NOT** describe the data?

A. there are approximately 10 faculy members that own 7 cars
B. skewed left
C. There are no values of 5
D. skewed right

Exercise 3.3.2.10
The third quartile is:

A. 1
B. 2
C. 3
D. 0.75

3.3.3 Quiz 3: Probability Topics[12]

Exercise 3.3.3.1
Given:

[12]This content is available online at <http://legacy.cnx.org/content/m17602/1.2/>.

- P(A) = 0.4
- P(B) = 0.6
- P(A OR B) = 0.91

Find P(A | B).

A. 0.24
B. 0.4
C. 0.15
D. Cannot be determined.

Exercise 3.3.3.2
If J and K are INDEPENDENT events, then which of the following is TRUE?

A. P(J OR K) = P(J) + P(K) - P(J)*P(K)
B. P(J AND K) = 0
C. J and K are mutually exclusive events.
D. P(J OR K) = 0

Exercise 3.3.3.3
A poll concerning credit cards found that 35 percent of respondents use a credit card that gives them one mile of air travel for every dollar they charge. Thirty percent of the respondents charge more than $2000 per month. Of those respondents who charge more than $2000, 80 percent use a credit card that gives them one mile of air travel for every dollar they charge. What is the probability that a randomly selected respondent expected to spend more than $2000 AND use a credit card that gives them a mile of air travel for every dollar they charge?

A. (0.80)(0.35)
B. (0.80)(0.30)
C. (0.30)(0.35)
D. 0.80

Exercise 3.3.3.4
If P(J) = 0.3, P(K) = 0.6, and J and K are independent events, then:

A. P(J and K) = 0
B. P(J OR K) = 0
C. P(J) does not equal P(J | K).
D. P(J OR K) = 0.72

Exercise 3.3.3.5
When sampling WITHOUT replacement, the second pick is

A. independent from the first pick.
B. a complement of the first pick.
C. mutually exclusive from the first pick.
D. dependent on the first pick.

Exercise 3.3.3.6
Given:

- P(A) = 0.4
- P(B) = 0.6

- P(A OR B) = 0.65

Find P(A AND B)

A. 0.35
B. 1
C. 0.05
D. 0.24

Exercise 3.3.3.7
In a survey at a California ski resort, 100 skiers and snowboarders of different age groups were surveyed. The information is shown in the table. Suppose one person is randomly selected. Find the probability that the person was a skier OR was age 11 - 20.

Age of Participants by Sport

	0-10	**11-20**	**21-40**	**40+**
Ski	10	12	30	8
Snowboard	6	17	12	5

Table 3.19

A. 77/100
B. 60/100
C. 12/100
D. 89/100

Exercise 3.3.3.8
A poll concerning credit cards found that 35 percent of respondents use a credit card that gives them one mile of air travel for every dollar they charge. Thirty percent of the respondents charge more than $2000 per month. Of those respondents who charge more than $2000, 80 percent use a credit card that gives them one mile of air travel for every dollar they charge. What does 0.80 represent?

A. P(air miles AND charge over $2000 per month)
B. P(charge over $2000 per month | air miles)
C. P(air miles OR charge over $2000 per month)
D. P(air miles | charge over $2000 per month)

Exercise 3.3.3.9
In a survey at a California ski resort, 100 skiers and snowboarders of different age groups were surveyed. The information is shown in the table. Suppose one person is randomly selected. Find the probability that the person was a snowboarder GIVEN he/she was age 21 - 40.

Age of Participants by Sport

	0-10	**11-20**	**21-40**	**40+**
Ski	10	12	30	8
Snowboard	6	17	12	5

Table 3.20

A. 40/100
B. 12/100
C. 12/40
D. 89/42

Exercise 3.3.3.10
Given:

- P(A) = 0.4
- P(B) = 0.6
- P(A OR B) = 0.65

Which of the following is FALSE?

A. A and B are mutually exclusive.
B. P(A OR B) = P(A) + P(B) - P(A AND B)
C. P(A) = P(B′)
D. A and B are dependent events.

3.3.4 Quiz 4: Discrete Distributions[13]

Exercise 3.3.4.1

X	P(X=x)
0	.1
1	.2
2	**?**
4	.3
6	.3

Table 3.21

Using the table, find the expected value.

A. 3.3
B. 3.5
C. 3.6
D. 3.4

Exercise 3.3.4.2
The following table shows the probability distribution function for the number of high school years that students at a local high school study a single foreign language.

[13]This content is available online at <http://legacy.cnx.org/content/m17603/1.2/>.

X	P(X=x)
0	0.12
1	0.08
2	
3	0.34
4	0.14

Table 3.22

Over the long run, the average number of years that we would expect students at this high school to study a single foreign language is:

A. 2.5
B. 3
C. 2
D. 2.3

Exercise 3.3.4.3

X	P(X=x)
0	.1
1	.2
2	**?**
4	.3
6	.3

Table 3.23

Using the table, find the probability that X is greater than 1.

A. 0.1
B. 0.7
C. 0.3
D. 0.6

Exercise 3.3.4.4
Approximately 70% of U.S. adults had at least one pet as a child. We randomly survey 60 U. S. adults. We are interested in the number that had at least one pet as a child. Does X follow a Binomial Distribution?

A. No, because not all children can have pets.
B. No, because 30% did not have pets.
C. Yes, because each adult has a 70% chance.
D. Yes, because most children like pets.

Exercise 3.3.4.5
The following table shows the probability distribution function for the number of high school years that students at a local high school study a single foreign language.

X	P(X=x)
0	.12
1	.08
2	
3	.34
4	.14

Table 3.24

If 10 graduating students from this high school were randomly selected, would it be unusual for all 10 of them to have studied exactly 3 years of a foreign language?

A. No, because each person is independent of the other.
B. Yes, because the probability for a student is 0.34, which is less than one-half.
C. No, because 3 is the mode.
D. Yes, because the probability is close to zero.

Exercise 3.3.4.6
If sampling without replacement occurs, do the picks follow the Binomial Distribution?

A. Yes, if we are counting the number of successes.
B. No, because the probability of success on each pick changes.
C. Yes, because each pick is independent from the others.
D. No, because we may not have any successes.

Exercise 3.3.4.7
The following table shows the probability distribution function for the number of high school years that students at a local high school study a single foreign language.

X	P(X=x)
0	.12
1	.08
2	
3	.34
4	.14

Table 3.25

What is the probability that X=2?

A. 0.42
B. 0.32
C. unable to determine
D. 0.20

Exercise 3.3.4.8
Approximately 70% of U.S. adults had at least one pet as a child. We randomly survey 60 U. S. adults. We are interested in the number that had at least one pet as a child. The probability that at least 3 adults had at least one pet as a child means:

A. P(X=0)+P(X=1)+P(X=2)+P(X=3)
B. P(X=0)+P(X=1)+P(X=2)
C. P(X=4)+P(X=5)+P(X=6)+ ...
D. P(X=3)+P(X=4)+P(X=5)+ ...

Exercise 3.3.4.9
Ninety-four percent of California community college transfers feel that their community college adequately prepared them to handle upper-division coursework at their transfer university. We randomly survey 14 California community college transfers. We are interested in the number that feel that their community college adequately prepared them to handle upper division coursework at their transfer university. List the values that X, the Random Variable, may take on.

A. 0, 1, 2, ..., 94
B. 1, 2, 3, ..., 14
C. 0, 1, 2, ..., 14
D. 1, 2, 3, ..., 94

Exercise 3.3.4.10
Ninety-four percent of California community college transfers feel that their community college adequately prepared them to handle upper-division coursework at their transfer university. We randomly survey 14 California community college transfers. We are interested in the number that feel that their community college adequately prepared them to handle upper division coursework at their transfer university. Find the probability that more than half felt that they were prepared.

A. 0.00
B. 1.00
C. 0.53
D. 6.59

3.3.5 Quiz 5: Continuous Random Variables[14]

Exercise 3.3.5.1
Given that X $\sim$ U(3, 15), find the probability that X is between 12 and 14.

A. 2/12
B. 12/14
C. 2/15
D. 2

Exercise 3.3.5.2
Given that X $\sim$ U(3, 15), find the probability that X is greater than 5 given that X is less than 10.

A. 5/12
B. 5/10
C. 5/7
D. 10/7

Exercise 3.3.5.3
Given that X $\sim$ U(3, 15), find the 70th percentile.

[14]This content is available online at <http://legacy.cnx.org/content/m17604/1.2/>.

A. 0.70
B. 5.4
C. 11.4
D. 10.5

Exercise 3.3.5.4
Given that X $\sim$ U(3, 15), f(x) =

A. 1/15
B. 1/18
C. 1/12
D. 1

Exercise 3.3.5.5
Given that X $\sim$ U(3, 15), what percent of the area is between 1 and 4?

A. 8 1/3
B. 25
C. 20
D. unable to determine

Exercise 3.3.5.6
The probability that "X is at most 3" is interpreted as:

A. P(X $<$ 3) + P(X=3)
B. P(X $<$ 3)
C. P(X $>$ 3)
D. P(X $>$ 3) + P(X = 3)

Exercise 3.3.5.7
Given that X $\sim$ Exp(0.4), find the decay rate.

A. 0.4
B. 1/0.4
C. 4
D. 2.5

Exercise 3.3.5.8
Given that X $\sim$ Exp(0.4), find the median.

A. 2.5
B. 1.25
C. 1.73
D. 1/4

Exercise 3.3.5.9
X follows an Exponential Distribution with an average of 12. Which of the following is true?

A. The median is 12.
B. The decay rate is 12.
C. The mode is 12.
D. The standard deviation is 12.

Exercise 3.3.5.10
X follows a Uniform Distribution from 2 to 5. What can be said of the median?

A. It is the same as the standard deviation.
B. Both (1) and (2) are correct.
C. It is the same as the average.
D. It is less than the average.

3.3.6 Quiz 6: The Normal Distribution[15]

Exercise 3.3.6.1
Given $X \sim N(300, 15)$, find $P(280 < X < 340)$.

A. 0.2000
B. 0.7460
C. 0.9050
D. 0.9999

Exercise 3.3.6.2
Given $X \sim N(300, 15)$, find the 70th percentile.

A. 0.5244
B. 210.00
C. 307.87
D. 324.96

Exercise 3.3.6.3
Given $X \sim N(300, 15)$, what can be said of the median?

A. The mode = median and the mode = the mean.
B. It is the same as the mode.
C. It is less than the average.
D. It is the same as the average.

Exercise 3.3.6.4
Given $X \sim N(300, 15)$, the area to the right of x = 330...

A. is the same as the area to the right of z = 2.
B. $P(X > 330)$ is the same as the area to the right of z = 2 AND to the left of X = 270.
C. is the same as the area to the left of x = 270.
D. is the same as the area to the left of x = 330.

Exercise 3.3.6.5
Given $X \sim N(300, 15)$, find the Interquartile Range (IQR).

A. 0.50
B. 310.12
C. 20.24
D. 289.99

[15]This content is available online at <http://legacy.cnx.org/content/m17605/1.2/>.

Exercise 3.3.6.6
Given X $\sim$ N(300, 15), find the z-score associated with x = 290.

A. 15/10
B. -10
C. 10/15
D. -10/15

Exercise 3.3.6.7
For what do we use z-scores?

A. Because of the use of technology, there is no longer any use for z-scores.
B. to standardize scores from two or more different normal distributions so that we may compare the scores.
C. to help us calculate uniform and exponential probabilities.
D. to make our calculations easier because the mean = 0.

Exercise 3.3.6.8
Given that X $\sim$ N(10, 2), X $>$ 20...

A. cannot happen.
B. can happen 1/5 of the time.
C. is very unlikely to occur.
D. we cannot determine its probability.

Exercise 3.3.6.9
Given that X $\sim$ N(10, 2) and Y follows the Exponential Distribution with a mean of 10, which of the following are correct?

A. The median for Y is greater than the median for X.
B. The median for Y is less than the median for X.
C. The percentiles for X and Y are also equal.
D. The median for X and Y are also equal.

Exercise 3.3.6.10
For data that is normally distributed, is it possible for the standard deviation to be larger than the mean?

A. No.
B. Yes.
C. There is not enough information to determine.

3.3.7 Quiz 7: The Central Limit Theorem[16]

Exercise 3.3.7.1
Given that X $\sim$ N(300, 15), we survey 20 at a time and are interested in the distribution of X-bar. As the number of data values averaged together gets larger, what happens to the standard error of the mean (the standard deviation of X-bar)?

[16]This content is available online at <http://legacy.cnx.org/content/m17606/1.2/>.

A. It becomes larger.
B. It becomes smaller.
C. It approaches the average of X-bar.
D. It approaches the standard deviation of X.

Exercise 3.3.7.2
Given X $\sim$ Exp(1/8), we survey 100 at a time and are interested in the distribution of X-bar. Find the standard deviation of X-bar.

A. 0.8
B. 0.0125
C. 0.0800
D. 0.125

Exercise 3.3.7.3
Given X $\sim$ Exp(1/8), we survey 100 at a time and are interested in the distribution of X-bar. Find the third quartile of X-bar.

A. 6
B. 0.6321
C. 8.54
D. 2.30

Exercise 3.3.7.4
Given that X $\sim$ N(300, 15), we survey 20 at a time and are interested in the distribution of X-bar. Find the 33rd percentile of the distribution for X-bar.

A. 298.6
B. 293.5
C. 301.4
D. 100.0

Exercise 3.3.7.5
Given that X $\sim$ N(300, 15), we survey 20 at a time and are interested in the distribution of X-bar. Find the z-score associated with x-bar = 290.

A. -10/15
B. -10
C. -2.9814
D. -13.3333

Exercise 3.3.7.6
Given X $\sim$ Exp(0.125), we survey 100 at a time and are interested in the distribution of X-bar. P(X-bar $<$ 7)= _____.

A. 0.1056
B. 0.5831
C. 0.9987
D. 0.0001

Exercise 3.3.7.7
Given X $\sim$ U(2,18), we survey forty at a time and are interested in the distribution of X-bar. The standard deviation of X-bar is:

A. 1.5811
B. 0.1155
C. 0.7303
D. 4.62

Exercise 3.3.7.8
Given X $\sim$ U(2,18), we survey forty at a time and are interested in the distribution of X-bar. P(X $<$ 4) is _____ P(X-bar $<$ 4).

A. less than
B. equal to
C. greater than
D. at most

Exercise 3.3.7.9
Given X $\sim$ U(2,18), we survey forty at a time and are interested in the distribution of X-bar. P(2 $<$ X $<$ 18) is _____ P(2 $<$ X-bar $<$ 18)

A. less than
B. equal to
C. greater than
D. at most

Exercise 3.3.7.10
Given that X $\sim$ N(300, 15), we survey 20 at a time and are interested in the distribution of X-bar. What can be said about the median of the random variable X-bar?

A. It is the same as the median of X.
B. It is the same as the average of X-bar.
C. It is the same as the average of X.
D. A, B, C are all correct.

3.3.8 Quiz 8: Confidence Intervals[17]

Exercise 3.3.8.1
When constructing a confidence interval for the population mean, the case where the population standard deviation is known is _____.

A. possible, and the most common
B. possible, but not common
C. possible, and quite common
D. impossible

Exercise 3.3.8.2
When constructing a Confidence Interval, which case is preferable?

A. large confidence level, small confidence interval
B. small confidence level, small confidence interval
C. small confidence level, large confidence interval

[17]This content is available online at <http://legacy.cnx.org/content/m17607/1.2/>.

D. large confidence level, large confidence interval

Exercise 3.3.8.3
Which of the following is NOT a point estimate?

A. x-bar
B. p-hat or p-prime
C. s
D. sigma

Exercise 3.3.8.4
When should the Student-t distribution be used in constructing a confidence interval for the population mean?

A. When the population proportion is known and the underlying population is normally distributed.
B. When the population standard deviation is unknown and the underlying population is normally distributed.
C. When the population proportion is unknown and the underlying population is normally distributed.
D. When the population standard deviation is known and the underlying population is normally distributed.

Exercise 3.3.8.5
When constructing a Confidence Interval for the population mean and both the sample standard deviation and the population standard deviation are known, which of the following should be used?

A. normal distribution using the sample standard deviation
B. normal distribution using the population standard deviation
C. student-t distribution using the population standard deviation
D. student-t distributuion using the sample standard deviation

Exercise 3.3.8.6
A study was done to determine the proportion of voters that feel that their local government is doing an adequate job. Of the 160 voters surveyed, 144 feel that their local government is doing an adequate job. Calculate the 95% confidence interval for the true proportion of voters that feel that their government is doing an adequate job.

A. (0.85, 0.95)
B. 0.90
C. (0.80, 1.00)
D. (144, 160)

Exercise 3.3.8.7
To reduce the error bound in a future study, which of the following should be done?

A. increase the sample size n
B. decrease the sample size n
C. conduct a biased survey
D. increase the confidence level

Exercise 3.3.8.8
A study was done to determine the average number of homes that a homeowner owns in his or her lifetime. For the 60 homeowners surveyed, the sample average was 4.2 and the sample standard deviation was 2.1. Calculate the 95% confidence interval for the true average number of homes that a person owns in his or her lifetime.

A. (3.90, 4.50)
B. (3.66, 4.74)
C. (4.01, 4.39)
D. (3.67, 4.73)

Exercise 3.3.8.9
A study was done to determine the average number of homes that a homeowner owns in his or her lifetime. For the 60 homeowners surveyed, the sample average was 4.2 and the sample standard deviation was 2.1. The distribution to use to calculate the 95% confidence interval is _____.

A. Exponential
B. Student-t with df = 59
C. Student-t with df = 60
D. Binomial

Exercise 3.3.8.10
Calculate the error bound for a survey in which the sample mean is 5, the population standard deviation is 3, the confidence level is 0.90, and the number surveyed is 12.

A. 1.56
B. 1.42
C. (3.58, 6.42)
D. (3.44, 6.56)

3.3.9 Quiz 9: Hypothesis Testing with a Single Mean[18]

Exercise 3.3.9.1
A study is done to see if the average age a "child" moves permanently out of his parents' home in the United States is at most 23. 43 U.S. Adults were surveyed. The sample average age was 24.2 with a standard deviation of 3.7. The p-value is

A. 0.0334
B. 2.13
C. 0.0167
D. 0.0197

Exercise 3.3.9.2
A study is done to see if the average age a "child" moves permanently out of his parents' home in the United States is at most 23. 43 U.S. Adults, all age 40, were surveyed. The sample average age was 24.2 with a standard deviation of 3.7. The alternate hypothesis is _____.

A. population mean >= 24.2

[18]This content is available online at <http://legacy.cnx.org/content/m17609/1.2/>.

B. population mean <=23
C. population mean > 24.2
D. population mean > 23

Exercise 3.3.9.3
A study is done to see if the average age a "child" moves permanently out of his parents' home in the United States is at most 23. 43 U.S. Adults, all age 40, were surveyed. The sample average age was 24.2 with a standard deviation of 3.7. Which is the Type I error?

A. Conclude that the average age is greater than 23, when it is 24.2.
B. Conclude that the average age is at most 24.2, when it is at most 24.2.
C. Conclude that the average age is at most 23, when it is greater than 23.
D. Conclude that the average age is greater than 23, when it is at most 23.

Exercise 3.3.9.4
A study is done to see if the average age a "child" moves permanently out of his parents' home in the United States is at most 23. 43 U.S. Adults, all age 40, were surveyed. The sample average age was 24.2 with a standard deviation of 3.7. Which is the Type II error?

A. Conclude that the average age is greater than 23, when it is at most 23.
B. Conclude that the average age is greater than 23, when it is 24.2.
C. Conclude that the average age is at most 24.2, when it is at most 24.2.
D. Conclude that the average age is at most 23, when it is greater than 23.

Exercise 3.3.9.5
Consider the statement, "New cars are expected to last an average of three years before needing major service done to them." With a p-value of 0.0079, we conclude that:

A. No conclusion can be made.
B. new cars last an average of less than three years before needing major service done to them.
C. new cars last an average of at least three years before needing major service done to them.

Exercise 3.3.9.6
Given the set of hypotheses: Ho: $p = 0.4$ Ha: $p < 0.4$. This test is _____.

A. two-tailed
B. right-tailed
C. left-tailed
D. no-tailed

Exercise 3.3.9.7
Given the set of hypotheses: Ho: $p = 0.4$ Ha: $p < 0.4$. The probability distribution to use for the hypothesis test is the

A. binomial
B. normal
C. student-t
D. exponential

Exercise 3.3.9.8
Given the set of hypotheses: Ho: $p = 0.4$ Ha: $p < 0.4$. If the estimated proportion is 0.35, then the p-value can be interpreted as

A. the probability that the estimated proportion is the same as the p-value.
B. the probability that the estimated proportion is at least 0.35, when the population proportion is, in fact, equal to 0.4.
C. the probability that the population proportion is at most 0.4, when the estimated proportion is equal to 0.35.
D. the probability that the estimated proportion is at most 0.35 when the population proportion is, in fact, equal to 0.4.

Exercise 3.3.9.9
Consider the statement, "New cars are expected to last an average of at least three years before needing major service done to them." Which of the following is the null hypothesis?

A. The population mean <=3.
B. The population mean < 3.
C. The population mean > 3.
D. The population mean is >= 3.

Exercise 3.3.9.10
Consider the statement, "New cars are expected to last an average of three years before needing major service done to them." With a p-value of 0.2456, which is the correct decision?

A. No decision can be made.
B. Reject the null hypothesis.
C. Do not reject the null hypothesis.

3.3.10 Quiz 10: Hypothesis Testing with Two Means[19]

Exercise 3.3.10.1
Of interest is whether the percent of full-time international college students that take over 16 units per term is the same as the percent of full-time local college students. Sixty full-time international students are surveyed. Forty-six of them take over 16 units per term. One hundred forty-nine full-time local students are surveyed. Ninety-eight of them take over 16 units per term. The hypothesis test to use is _____.

A. matched or paired samples
B. two proportions
C. independent group means, population standard deviations known
D. independent group means, population standard deviations unknown

Exercise 3.3.10.2
A study is done to determine if girls lose their first baby tooth earlier, on average, than boys. Twenty-five girls and twenty-five boys are surveyed. The average ages were 5.8 years for girls with a standard deviation of 0.6 years, and 5.9 years for boys with a standard deviation of 0.7 years. The hypothesis test to use is _____.

A. two proportions
B. matched or paired samples
C. independent group means, population standard deviations known
D. independent group means, population standard deviations unknown

[19]This content is available online at <http://legacy.cnx.org/content/m17610/1.2/>.

Exercise 3.3.10.3
Fourteen cars from two different models of a car manufacturer are compared to see if the smaller model has a higher average MPG than the larger model. From years of testing these models, it is known that the standard deviation of MPG is 3.4 MPG for the smaller model and 4.0 MPG for the larger one. From this survey, the sample means and standard deviations are 28.2 and 3.0, and 22.6 and 5.1, respectively. If we conduct a hypothesis test, the decision and conclusion are:

A. Reject the null hypothesis and conclude that the average MPG for the smaller car is higher than for the larger model.
B. Do not reject the null hypothesis and conclude that the average MPGs are the same.
C. Reject the null hypothesis and conclude that the average MPGs are different.
D. Do not reject the null hypothesis and conclude that the average MPG for the smaller car is higher than for the larger model.

Exercise 3.3.10.4
Eighty-four people participate in a coordination study. They are each timed for how long they can jump rope without a mistake with their eyes open. Then, they each repeat the task with their eyes closed. For each individual, the difference in times is calculated. The purpose of the study is to determine if the lack of vision in normally seeing individuals affects coordination. The hypothesis test to use is _____.

A. two proportions
B. matched or paired samples
C. independent group means, population standard deviations unknown
D. independent group means, population standard deviations known

Exercise 3.3.10.5
Twelve pairs of identical twins that were separated at birth are reunited at age 21. Each twin is weighed. Of interest is if identical twins raised separately will weigh within 10 pounds of each other as young adults. The sample average difference was 12.1 pounds with a standard deviation of 3.4 pounds. If we conduct a hypothesis test, the distribution to use is _____.

A. Normal
B. Binomial
C. Student-t with df = 24
D. Student-t with df = 11

Exercise 3.3.10.6
Forty cars from two different models of a car manufacturer are compared to see if the smaller model has a higher average MPG than the larger model. From years of testing these models, it is known that the standard deviation of MPG is 3.4 MPG for the smaller model and 3.6 MPG for the larger one. From this survey, the sample means and standard deviations are 28.2 and 3.5, and 22.6 and 3.7, respectively. The hypothesis test to use is _____.

A. two proportions
B. independent group means, population standard deviations known
C. matched or paired samples
D. independent group means, population standard deviations unknown

Exercise 3.3.10.7
Thirty children and forty-five adults were surveyed to determine if children watch, on average, the same amount of television as adults per day. The averages from the study were 3.4 and 2.7 hours per day, respectively. The standard deviations from the study were 2.3 and 1.4 hours per day, respectively. The hypothesis test to use is _____.

A. matched or paired samples
B. two proportions
C. independent group means, population standard deviations unknown
D. independent group means, population standard deviations known

Exercise 3.3.10.8
Twelve pairs of identical twins that were separated at birth are reunited at age 21. Each twin is weighed. Of interest is if identical twins raised separately will weigh within 10 pounds of each other as young adults. The hypothesis test to use is _____.

A. independent group means, population standard deviations unknown
B. independent group means, population standard deviations known
C. matched or paired samples
D. two proportions

Exercise 3.3.10.9
One hundred men and one hundred women are surveyed to determine if the percent of women that lie about their weight is the same as the percent of men, or if the percent of women is higher than the percent of men. The hypothesis test to use is _____.

A. independent group means, population standard deviations known
B. two proportions
C. independent group means, population standard deviations unknown
D. matched or paired samples

Exercise 3.3.10.10
Fourteen cars from two different models of a car manufacturer are compared to see if the smaller model has a higher average MPG than the larger model. From years of testing these models, it is known that the standard deviation of MPG is 3.4 MPG for the smaller model and 4.0 MPG for the larger one. From this survey, the sample means and standard deviations are 28.2 and 3.0, and 22.6 and 5.1, respectively. If we conduct a hypothesis test, the p-value is _____.

A. 0.0004
B. 0.0002
C. 0.0000
D. 0.0010

3.3.11 Quiz 11: The Chi-Square Distribution[20]

Exercise 3.3.11.1
As the degrees of freedom increase (and especially when the degrees of freedom are more than 90), the graph of the chi-square distribution looks more and more _____.

A. symmetrical
B. skewed right
C. skewed left
D. asymmetrical

[20]This content is available online at <http://legacy.cnx.org/content/m17611/1.2/>.

Exercise 3.3.11.2
The expected values are what we have from _____.

A. data
B. sampling
C. theory
D. experiments

Exercise 3.3.11.3
Which test is the correct one to use when determining if the gender of a person is independent of the college major of the person?

A. Goodness-of-Fit
B. Test for Independence

Exercise 3.3.11.4
The Goodness-of-Fit hypothesis test is typically a _____.

A. two-tailed test
B. wagging-tailed test
C. left-tailed test
D. right-tailed test

Exercise 3.3.11.5
What is the relationship between the mean and the standard deviation of the chi-square distribution?

A. They are the same.
B. They are inverses of each other.
C. The standard deviation is twice the mean.
D. The standard deviation is the square root of 2 times the mean.

Exercise 3.3.11.6
The Chi-Square Test for Independence is typically a _____.

A. left-tailed test
B. right-tailed test
C. two-tailed
D. wagging-tailed

Exercise 3.3.11.7
Which test is the correct one to use when determining if a class distribution of grades follows the normal distribution?

A. Goodness-of-Fit
B. Test for Independence

Exercise 3.3.11.8
Which test is the correct one to use when determining if the numbers picked in the lottery are randomly selected?

A. Goodness-of-Fit
B. Test for Independence

Exercise 3.3.11.9
Which test is the correct one to use when determining if the religion of a person is related to his/her political party affiliation?

A. Goodness-of-Fit
B. Test for Independence

Exercise 3.3.11.10
An eight-sided die is rolled 160 times. The number of 1's, 2's, 3's, 4's, 5's, 6's, 7's & 8's obtained are 24, 36, 15, 17, 9, 22, 18 & 19, respectively. We are testing to see if the die is fair. What is the test statistic for this problem?

A. 12.7
B. 21.8
C. 9.4
D. 46.3

3.3.12 Quiz 12: Linear Regression and Correlation[21]

Exercise 3.3.12.1
If there is a linear relationship between the quantity of food a person consumes per day and the person's weight, the quantity of food a person consumes per day is the _____.

A. independent variable
B. Unable to determine
C. dependent variable

Exercise 3.3.12.2
A correlation coefficient for 9 pairs of data is calculated to be -0.213. Is the relationship between the variables statistically significant?

A. Unable to determine
B. No
C. Yes

Exercise 3.3.12.3
Consider the following pairs of data (independent variable given first):

(17, 56); (13, 48); (35, 65); (89, 146); (55, 121); (86, 130)

Calculate the Least Squares Line.

A. y-hat = -20.93 + 0.73x
B. y-hat = 33.33 + 1.24x
C. y-hat = 1.24 + 33.3x
D. y-hat = 0.73 - 20.93x

Exercise 3.3.12.4
A correlation coefficient for 6 pairs of data is calculated to be 0. Then,

[21] This content is available online at <http://legacy.cnx.org/content/m17612/1.2/>.

A. there is positive correlation between the variables.
B. the Line of Best Fit has a negative slope.
C. there is negative correlation between the variables.
D. the Line of Best Fit has a slope of zero.

Exercise 3.3.12.5
A study is done to see if there is a linear relationship between the life expectancy of an individual and the year of birth. The year of birth is the _____.

A. Unable to determine
B. dependent variable
C. independent variable

Exercise 3.3.12.6
If you determine a point is an outlier, you would

A. ignore it.
B. always delete it and then recalculate the line of best fit.
C. examine it carefully and try to determine what is causing it to be an outlier.
D. use it in the calculation of the Sum of Squared Errors.

Exercise 3.3.12.7
Consider the following pairs of data (independent variable given first):

(17, 56); (13, 48); (35, 65); (89, 146); (55, 121); (86, 130)

Find the estimated y for an x-value of 40.

A. -836
B. 1334
C. 83
D. 8.3

Exercise 3.3.12.8
A study is done to see if there is a linear relationship between the calendar year and the population of a particular country. The calendar year is the _____.

A. dependent variable
B. Unable to determine
C. independent variable

Exercise 3.3.12.9
Consider the following pairs of data (independent variable given first):

(16, 56); (10, 98); (35, 105); (4, 70); (12, 121)

The relationship between the two variables is _____.

A. linear
B. not significant
C. parabolic
D. exponential

Exercise 3.3.12.10
Consider the following pairs of data (independent variable given first):

(16, 56); (10, 98); (35, 105); (4, 70); (12, 121)

The regression line is _____.

A. steeply sloped downward
B. almost horizontal
C. steeply sloped upward

Solutions to Exercises in Chapter 3

Solutions to Skills Practice Exam 1: Chapters 1, 2, & 12

Solution to Exercise 3.1.1.1 (p. 15)
A
Solution to Exercise 3.1.1.2 (p. 15)
B
Solution to Exercise 3.1.1.3 (p. 15)
B
Solution to Exercise 3.1.1.4 (p. 16)
C
Solution to Exercise 3.1.1.5 (p. 16)
D
Solution to Exercise 3.1.1.6 (p. 16)
A
Solution to Exercise 3.1.1.7 (p. 16)
D
Solution to Exercise 3.1.1.8 (p. 16)
D
Solution to Exercise 3.1.1.9 (p. 17)
C
Solution to Exercise 3.1.1.10 (p. 17)
B
Solution to Exercise 3.1.1.11 (p. 17)
A
Solution to Exercise 3.1.1.12 (p. 17)
A
Solution to Exercise 3.1.1.13 (p. 18)
A
Solution to Exercise 3.1.1.14 (p. 18)
A
Solution to Exercise 3.1.1.15 (p. 18)
A
Solution to Exercise 3.1.1.16 (p. 18)
B
Solution to Exercise 3.1.1.17 (p. 18)
B
Solution to Exercise 3.1.1.18 (p. 19)
D
Solution to Exercise 3.1.1.19 (p. 19)
A
Solution to Exercise 3.1.1.20 (p. 19)
B
Solution to Exercise 3.1.1.21 (p. 19)
D

Solutions to Skills Practice Exam 2: Chapters 3, 4, 5, & 6

Solution to Exercise 3.1.2.1 (p. 20)
A

Solution to Exercise 3.1.2.2 (p. 20)
B
Solution to Exercise 3.1.2.3 (p. 20)
B
Solution to Exercise 3.1.2.4 (p. 20)
D
Solution to Exercise 3.1.2.5 (p. 21)
A
Solution to Exercise 3.1.2.6 (p. 21)
B
Solution to Exercise 3.1.2.7 (p. 21)
B
Solution to Exercise 3.1.2.8 (p. 21)
D
Solution to Exercise 3.1.2.9 (p. 21)
D
Solution to Exercise 3.1.2.10 (p. 21)
D
Solution to Exercise 3.1.2.11 (p. 22)
A
Solution to Exercise 3.1.2.12 (p. 22)
B
Solution to Exercise 3.1.2.13 (p. 22)
A
Solution to Exercise 3.1.2.14 (p. 22)
B
Solution to Exercise 3.1.2.15 (p. 22)
A
Solution to Exercise 3.1.2.16 (p. 23)
B
Solution to Exercise 3.1.2.17 (p. 23)
B
Solution to Exercise 3.1.2.18 (p. 23)
A
Solution to Exercise 3.1.2.19 (p. 23)
C
Solution to Exercise 3.1.2.20 (p. 23)
A
Solution to Exercise 3.1.2.21 (p. 24)
C
Solution to Exercise 3.1.2.22 (p. 24)
D
Solution to Exercise 3.1.2.23 (p. 24)
C
Solution to Exercise 3.1.2.24 (p. 24)
B
Solution to Exercise 3.1.2.25 (p. 24)
D
Solution to Exercise 3.1.2.26 (p. 25)
D

Solution to Exercise 3.1.2.27 (p. 25)
A
Solution to Exercise 3.1.2.28 (p. 25)
B
Solution to Exercise 3.1.2.29 (p. 26)
A
Solution to Exercise 3.1.2.30 (p. 26)
B
Solution to Exercise 3.1.2.31 (p. 26)
D
Solution to Exercise 3.1.2.32 (p. 27)
A
Solution to Exercise 3.1.2.33 (p. 27)
A
Solution to Exercise 3.1.2.34 (p. 27)
C
Solution to Exercise 3.1.2.35 (p. 27)
B
Solution to Exercise 3.1.2.36 (p. 27)
B
Solution to Exercise 3.1.2.37 (p. 27)
D
Solution to Exercise 3.1.2.38 (p. 28)
D
Solution to Exercise 3.1.2.39 (p. 28)
B
Solution to Exercise 3.1.2.40 (p. 28)
A

Solutions to Skills Practice Exam 3: Chapters 7, 8, 9, & 10

Solution to Exercise 3.1.3.1 (p. 29)
B
Solution to Exercise 3.1.3.2 (p. 29)
C
Solution to Exercise 3.1.3.3 (p. 29)
A
Solution to Exercise 3.1.3.4 (p. 29)
C
Solution to Exercise 3.1.3.5 (p. 29)
D
Solution to Exercise 3.1.3.6 (p. 30)
C
Solution to Exercise 3.1.3.7 (p. 30)
D
Solution to Exercise 3.1.3.8 (p. 30)
B
Solution to Exercise 3.1.3.9 (p. 30)
A
Solution to Exercise 3.1.3.10 (p. 31)
D

Solution to Exercise 3.1.3.11 (p. 31)
C
Solution to Exercise 3.1.3.12 (p. 31)
D
Solution to Exercise 3.1.3.13 (p. 31)
C
Solution to Exercise 3.1.3.14 (p. 32)
A
Solution to Exercise 3.1.3.15 (p. 32)
A
Solution to Exercise 3.1.3.16 (p. 32)
D
Solution to Exercise 3.1.3.17 (p. 32)
C
Solution to Exercise 3.1.3.18 (p. 32)
C
Solution to Exercise 3.1.3.19 (p. 33)
C
Solution to Exercise 3.1.3.20 (p. 33)
B
Solution to Exercise 3.1.3.21 (p. 33)
A
Solution to Exercise 3.1.3.22 (p. 33)
A
Solution to Exercise 3.1.3.23 (p. 33)
C
Solution to Exercise 3.1.3.24 (p. 33)
D
Solution to Exercise 3.1.3.25 (p. 34)
B
Solution to Exercise 3.2.1.1 (p. 35)
B
Solution to Exercise 3.2.1.2 (p. 35)
D
Solution to Exercise 3.2.1.3 (p. 36)
C
Solution to Exercise 3.2.1.4 (p. 36)
D
Solution to Exercise 3.2.1.5 (p. 36)
B
Solution to Exercise 3.2.1.6 (p. 36)
D
Solution to Exercise 3.2.1.7 (p. 36)
A
Solution to Exercise 3.2.1.8 (p. 37)
A
Solution to Exercise 3.2.1.9 (p. 37)
C
Solution to Exercise 3.2.1.10 (p. 38)
B

Solution to Exercise 3.2.1.11 (p. 38)
C
Solution to Exercise 3.2.1.12 (p. 38)
A
Solution to Exercise 3.2.1.13 (p. 38)
D
Solution to Exercise 3.2.2.1 (p. 39)
A
Solution to Exercise 3.2.2.2 (p. 39)
D
Solution to Exercise 3.2.2.3 (p. 39)
B
Solution to Exercise 3.2.2.4 (p. 39)
C
Solution to Exercise 3.2.2.5 (p. 40)
A
Solution to Exercise 3.2.2.6 (p. 40)
D
Solution to Exercise 3.2.2.7 (p. 40)
D
Solution to Exercise 3.2.2.8 (p. 40)
B
Solution to Exercise 3.2.2.9 (p. 40)
C
Solution to Exercise 3.2.2.10 (p. 40)
D
Solution to Exercise 3.2.2.11 (p. 41)
B
Solution to Exercise 3.2.2.12 (p. 41)
A
Solution to Exercise 3.2.2.13 (p. 41)
C
Solution to Exercise 3.2.2.14 (p. 41)
B
Solution to Exercise 3.2.2.15 (p. 42)
B
Solution to Exercise 3.2.2.16 (p. 42)
B
Solution to Exercise 3.2.2.17 (p. 42)
B
Solution to Exercise 3.2.2.18 (p. 42)
C
Solution to Exercise 3.2.3.1 (p. 42)
B
Solution to Exercise 3.2.3.2 (p. 44)
A
Solution to Exercise 3.2.3.3 (p. 44)
D
Solution to Exercise 3.2.3.4 (p. 45)
C

Solution to Exercise 3.2.3.5 (p. 45)
A
Solution to Exercise 3.2.3.6 (p. 45)
B
Solution to Exercise 3.2.3.7 (p. 45)
B
Solution to Exercise 3.2.3.8 (p. 45)
A
Solution to Exercise 3.2.3.9 (p. 46)
D
Solution to Exercise 3.2.3.10 (p. 46)
C
Solution to Exercise 3.2.3.11 (p. 46)
B
Solution to Exercise 3.2.3.12 (p. 46)
D
Solution to Exercise 3.2.3.13 (p. 46)
C
Solution to Exercise 3.2.4.1 (p. 47)
C
Solution to Exercise 3.2.4.2 (p. 48)
B
Solution to Exercise 3.2.4.3 (p. 48)
C
Solution to Exercise 3.2.4.4 (p. 48)
C
Solution to Exercise 3.2.4.5 (p. 48)
A
Solution to Exercise 3.2.4.6 (p. 48)
B
Solution to Exercise 3.2.4.7 (p. 49)
A
Solution to Exercise 3.2.4.8 (p. 49)
A
Solution to Exercise 3.2.4.9 (p. 49)
D
Solution to Exercise 3.2.4.10 (p. 49)
A
Solution to Exercise 3.2.4.11 (p. 49)
B
Solution to Exercise 3.2.4.12 (p. 50)
C
Solution to Exercise 3.2.4.13 (p. 50)
D
Solution to Exercise 3.2.4.14 (p. 50)
B
Solution to Exercise 3.2.4.15 (p. 50)
D
Solution to Exercise 3.2.4.16 (p. 51)
C

Solution to Exercise 3.2.4.17 (p. 51)
A
Solution to Exercise 3.2.4.18 (p. 51)
A
Solution to Exercise 3.2.5.1 (p. 52)
A. 35

B. 8.3666
Solution to Exercise 3.2.5.2 (p. 52)
B, C, D, and F
Solution to Exercise 3.2.5.3 (p. 52)
Ho: Public high school students attend school in equal numbers for each day of the school week

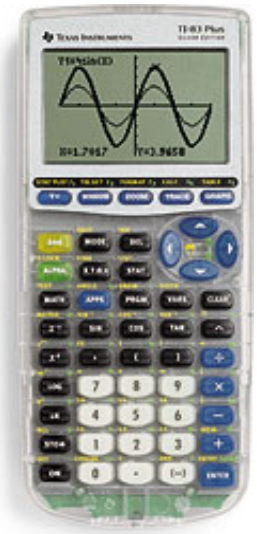
Ha: Public high school students DO NOT attend school in equal numbers for each day of the school week
Solution to Exercise 3.2.6.1 (p. 53)
A
Solution to Exercise 3.2.6.2 (p. 53)
D
Solution to Exercise 3.2.6.3 (p. 53)
C
Solution to Exercise 3.2.6.4 (p. 53)
B
Solution to Exercise 3.2.6.5 (p. 54)
B
Solution to Exercise 3.2.6.6 (p. 54)
D

Chapter 4

Calculator Instructions

4.1 Calculator Resources and Instructions[1]

4.1.1 Graphing Calculator Instructions



- TI-83 video tutorials are available here: (Part 1[2], Part 2[3]).
- The Discrete Mean & Stdev link shows how to calculate a mean and stdev for a discrete random variable.
- The Outliers link shows how to calculate outliers using the lists.
- The Matrix: TI-89 link shows how to create a matrix using the TI-89 calculator for use in a **Test of Independence**.
- The Random Numbers link shows how to generate random numbers.
- The Sorting link shows how to sort a list.
- The TI-89 link gives some general instructions for the TI-89 plus linear regression instructions.
- Link to Graphing Calculator Help[4] for Several TI Calculators

[1] This content is available online at <http://legacy.cnx.org/content/m17581/1.3/>.
[2] "Elementary Statistics: Video Lecture of TI-83 Calculator Instructions Pt. 1" <http://legacy.cnx.org/content/m17574/latest/>
[3] "Elementary Statistics: Video Lecture of TI-83 Calculator Instructions Pt. 2" <http://legacy.cnx.org/content/m17575/latest/>
[4] http://www.prenhall.com/esm/app/calc_v2

4.1.2 Calculating the Mean and Standard Deviation of a Discrete Probability Distribution on the TI-83 and TI-86

1. Enter the possible values for your random variable X in list `L1`.
2. Enter the probabilities for each value of X in list `L2` in the position next to the value of X.
3. Calculate "One Variable Statistics" for lists `L1` and `L2`.
4. (Do this the same way you calculate one variable statistics for data values and frequencies when given a set of data.)
5. The calculator will give the mean as "x-bar" $\bar{x}$ although we know that this mean is actually μ because it is the mean of a probability distribution.
6. The calculator will give the standard deviation as σ which indicates the standard deviation of a probability distribution (as well as the standard deviation of a population).
7. The calculator does not give you a value for s because the frequencies you gave it are not whole numbers.

4.1.3 Outlier Instructions for the TI-83, 86, and 89 Calculators

When you finish going over these instructions, do TEXT problem #5 ("stories" and "height of building") in Ch. 12. One of the points is an outlier.

This explains how to find outliers on various calculators. Suppose the data is (3,5), (6,8), (9,7), (5,20). The `xlist` is 3, 6, 9, 5 and the `ylist` is 5, 8, 7, 20. Put the `xlist` into `L1` and the `ylist` into `L2`. Do the linear regression. `yhat = 11.2267 - .2133x`

> NOTE: TI-89: Use Flashapps to enter your lists and then find your instructions below the instructions for the TI-83 & 86.

4.1.3.1 For TI-83 & 86 Calculators

1. Go back to where you entered the lists `L1` and `L2` and go to the list name `L3`. Enter `11.2267-.2133L1` (You enter the equation at the bottom of the screen where it says `L3`. Press `Enter`. In `L3` are the `yhat` values.
2. Arrow to the list name `L4`. Enter `L2-L3`. Press `Enter`. (In `L4` are the `y - yhat` values.)
3. Arrow to the list name `L5`. Enter `L4^2`. Press `Enter`. (In `L5` are the `(y - yhat)^2` values.)
4. Continue by finding the Instructions for the appropriate calculator below (83 or 86):

4.1.3.2 For TI-83

1. Exit to the Home Screen. Clear it. Press `2nd LIST`. Arrow to `MATH`. Press `5:sum`. (Press `L5`). Press `Enter`. You should see 137.1467 (to 4 decimal places). This is the SSE.
2. Calculate s. Press the square root symbol and enter `(137.1467/2)`. (You get the denominator by taking the number of data points and subtracting 2: 4 - 2 = 2.) Press `Enter`. You should see 8.2809 (to 4 decimal places).
3. Multiply 8.2809 by 1.9. You should see 15.7337.
4. Press `L4`. Press `Enter`. (Use the arrow keys to scroll through the list.)
5. Compare 15.7337 to the absolute values of the numbers in `L4`. If any absolute value is greater than or equal to 15.7337, then the corresponding point is an outlier.
6. Absolute values of the numbers in `L4` are 5.587, 1.947, 2.307, 9.8398. None of them are greater than 15.7337, so no point is an outlier.

4.1.3.3 For TI-86

1. Exit to the Home Screen. Clear it. Press 2nd LIST. Press F5 (OPS). Press MORE. Press F1 (sum). Press 2nd F3 (NAMES). Find the F key with L5 and press it. Press Enter. You should see 137.1467 (to 4 decimal places). This is the SSE.
2. Calculate s. Press the square root symbol and enter (137.1467/2). (You get the denominator by taking the number of data points and subtracting 2: 4 - 2 = 2.) Press Enter. You should see 8.2809 (to 4 decimal places).
3. Multiply 8.2809 by 1.9. You should see 15.7337.
4. Press L4. Press Enter. (Use the arrow keys to scroll through L4.)
5. Compare 15.7337 to the absolute values of the numbers in L4. If any absolute value is greater than or equal to 15.7337, then the corresponding point is an outlier.
6. Absolute values of the numbers in L4 are 5.587, 1.947, 2.307, 9.8398. None of them are greater than 15.7337 so no point is an outlier.

4.1.3.4 For TI-89

1. **NOTE:** When you do Linear Regression, a list called "resid" is created automatically. This list has the y - yhat values in it.
2. Go into Flashapps and into your lists. Arrow to "resid" so you see it. Then arrow to the list name L3. Press F3. Press 1:names. Arrow down to STATVARS. If it is not checked, press F4. Then arrow down to resid. Press Enter. Press ^2. L3 will have the (y - yhat)^2 values. Press HOME and Press F1 8 to clear it. Press 2nd MATH. Press 3:List. Press 6:Sum. Press alpha L3. Depending on how you have MODE Display Digits set, you should see approximately 137.1467. This is the SSE.
3. Calculate s. (You should be HOME.) Press clear. Press the square root symbol and enter 137.1467/2). (You get the denominator by taking the number of data points and subtracting 2: 4 - 2 = 2.) Press Enter. You should see 8.2809 (to 4 decimal places).
4. Press the times key and enter 1.9. Press Enter. You should see 15.7337
5. Press clear. Press 2nd VAR-LINK. Arrow down to resid (It is below STAT VARS). Press Enter. Arrow up to the list. Scroll through the list using the arrow keys.
6. Compare 15.7337 to the absolute values of the numbers in the list. If any absolute value is greater than or equal to 15.7337, then the corresponding point is an outlier.
7. Absolute values of the numbers in the list are approximately 5.59, 1.95, 2.31, 9.84. None of them are greater than 15.7337 so no point is an outlier.

4.1.4 Create a Matrix to use in a Test of Independence on the TI-89

1. Press APPS 6:Data/Matrix Editor
2. Press 3:New
3. Arrow over and down to 2:Matrix.
4. Press Enter
5. Arrow down to Folder. Either use the one that is there or arrow over and down to another folder name (don't use statvars) and press Enter.
6. Arrow down to Variable and enter a name you will remember.
7. Arrow down to Row dimension and enter the number of rows you want.
8. Arrow down to Column dimension and enter the number of columns you want. (**NOTE:** You can change these numbers if you want for a different problem.)
9. Press Enter until you see your matrix with zeroes as the entries. Fill in your matrix with the data from the table.
10. Press APPS
11. Press 1:Flashapps

12. Press Enter
13. Press F6 TESTS
14. Press 8:Chi2 2-way
15. Enter the name of your matrix at Observed Mat:
16. Press Enter.
17. You should see the screen with the test statistic and the p-value.

- To change the size of your matrix, press APPS 6:Matrix/Data Editor 2:Open.
- Then fill in the OPEN screen with Matrix, the correct folder, and the correct name of your matrix.
- Press Enter until you see your matrix.
- To resize it, press F6 Util 6:Resize Matrix. Enter the row dimension and arrow down to column dimension and enter that number. Press Enter until you see your resized matrix.

4.1.5 Generating Random Numbers with the TI Calculators

The following functions will generate random numbers from the list of numbers 1 - 60.

4.1.5.1 TI-83

1. Press MATH. Arrow over to PRB.
2. Press 5:randInt. Enter (1,60).
3. Press Enter and you will see the first random number.
4. Keep pressing Enter to get random numbers between 1 and 60, inclusive.

4.1.5.2 TI-86

1. Press 2nd MATH.
2. Press PROB (in F2).
3. Press randint (in F5). Enter (1,60).
4. Press Enter and you will see the first random number.
5. Press Enter and you will see the first random number.

4.1.5.3 TI-89

- Press 2nd MATH.
- Press 7:Probability.
- Press 4:rand. Enter (1,60)and press Enter.
- You will see the first random number.
- Keep pressing Enter to get random numbers between 1 and 60, inclusive.

4.1.6 How to Sort Data Using the TI Calculators

Only sort data where the frequencies are all 1.

4.1.6.1 TI-83

1. Enter the data into a list L1, L2, L3, L4, L5, or L6.
2. Press 2nd LIST (above the STAT key).
3. Arrow over (use the right arrow) to OPS.
4. Press 1 (for 1:SORTA).
5. Enter the name of your list and a right parenthesis. Press Enter.
6. Press STAT 1 and look at your list. It should be in sorted order.

4.1.6.2 TI-86

1. Enter the data into a list.
2. Press EXIT.
3. Press 2nd LIST (above – key).
4. Press OPS (in F5). Press sortA (in F2).
5. Enter the list name by pressing 2nd NAMES (in M3).
6. Arrow to your list and press the appropriate F key.
7. Press the STO-> key.
8. Enter the same list name. Press Enter.
9. Check that your list is sorted by going back into 2nd STAT EDIT.

4.1.6.3 TI-89

NOTE: For the TI-89, get Flashapps from the TI Web site or have your instructor put it into your calculator.

1. Press APPS 1 (for 1:Flashapps). Press Enter.
2. Press Enter again. Enter your data into a list (Enter data into one of the L lists, L1, L2, L3, L4).
3. Press F3 (for List). Press 2 (for 2:Ops).
4. Press 1 (for 1:Sort List). If you see your list name, press Enter. If the correct list name is not there, then enter it. Press Enter.
5. You should see your list in sorted order.

4.1.7 Notes for the TI-89 Calculator

In most TI-89 calculators, you must load a new operating system first and then the APPS statistics program. You can either go to your instructor OR you can go to the TI-89 site to get the operating system and the APPS statistics program. You must go to the TI-89 site to get the Guidebook. It has all the instructions for running the statistics program.

To go to the TI-89 site, click http://education.ti.com[5] to get to the TI-89 link. Then choose "apps" and "Handheld Software Application." From this page, you can download the operating system (version 2.05) and statistics program (Statistics with List Editor - this page will have both the operating system and the program).

You must then load the Advanced Mathematics Software Operating System and the Statistics with List Editor from your computer to the TI-89 calculator (unless your instructor has loaded them directly into your calculator). For that, you will need the TI-GRAPH LINK™ software and the TI-GRAPH LINK™ Cable. TI sells them on their Web Site.

[5] http://education.ti.com/

4.1.7.1 Getting Started

Create the folder "mystat" (for statistics):

1. Press 2nd VAR-LINK. Press F1 Manage.
2. Press 5:Create Folder. Enter the name "mystat" and press Enter twice.

Make mystat your current folder:

1. Press MODE. Arrow down to Current Folder and arrow over and down to mystat.
2. Press Enter twice. You should see the name MYSTAT in the lower left corner.

Creating list names L1, L2, and L3:

1. Press APPS 1:Flashapps. Press Enter.
2. Arrow up into the name area of the lists and over until you reach a blank title area.
3. Press L (above the 4). Press alpha. Press 1. Press Enter.
4. Arrow up into the name area of the lists and over until you reach a blank title area.
5. Press L. Press alpha. Press 2. Press Enter.
6. Arrow up into the name area of the lists and over until you reach a blank title area.
7. Press L. Press alpha. Press 3. Press Enter.

4.1.7.2 Linear Regression

Given the data set: (3, 5), (6, 8), (9,7), (5, 20). The xlist is 3, 6, 9, 5 and the ylist is 5, 8, 7, 20. Put the xlist into L1 and the ylist into L2.

4.1.7.3 Constructing a Scatter Plot

1. Make sure you are using Flashapps (Press APPS 1:Flashapps. Press Enter.)
2. **SCATTERPLOT:** After you are have entered your lists in L1 and L2, press F2.
3. Press 1:Plot Setup. Highlight Plot 1 and make sure there are no checks next to any other plots. If there are, arrow to the plot and press F4.
4. Then arrow back to Plot 1.
5. Press F1: Define. For Plot Type, press the right arrow and press 1:Scatter.
6. Arrow down, press the right arrow and press 1:Box.
7. Arrow down to x. Press alpha L1. Arrow down to y and press alpha L2.
8. Arrow down to Use Freq and Categories? and use the right arrow. Highlight NO and press Enter.
9. Press Enter again.
10. Press F5 Zoomdata. You should see the scatterplot. Press F3 to trace and the arrow keys to see the coordinates of the points.

4.1.7.4 Calculating the Regression Equation

1. Press APPS, 1:Flashapps, and Enter.
2. Press F4:Calc.
3. Press 3:Regressions.
4. Press 1:LinReg (ax+b). For x List, enter alpha L1. Arrow down. For y List, enter alpha L2.
5. For Store RegEqn to:, arrow right and arrow down to y1(x) (or any one of the y's) and press Enter.
6. Press Enter. You should see a screen with a, b, r^2, and r on it. The regression is complete.
7. Write down the equation from the information and press Enter.
8. The linear regression is yhat = 11.2267 - .2133x

4.1.7.5 Drawing the Regression Line

1. Press the key with the green diamond on it (it is below the 2nd key) and press Y= (above the F1 key).
2. This is the **Line of Best Fit**.
3. Press the key with the green diamond on it and press GRAPH (above the F3 key). The line will be drawn.

4.1.7.6 Outliers

1. When you do Linear Regression, a list called "resid" is created automatically.
2. This list has the "y - yhat" values in it.
3. Go into Flashapps and into your lists.
4. Arrow to "resid" so you see it.
5. Then, arrow to the list name L3. Press F3.
6. Press 1:names. Arrow down to STATVARS. If it is not checked, press F4.
7. Then, arrow down to resid. Press Enter. Press ^2. Press Enter. L3 will have the (y - yhat)^2 values.
8. Press HOME and Press F1 8 to clear it.
9. Press 2nd MATH. Press 3:List. Press 6:Sum. Press alpha (L3).
10. Depending on how you have MODE Display Digits set, you should see approximately 137.1467. This is the SSE.
11. Calculate s. (You should be HOME.) Press clear.
12. Press the square root symbol and enter 137.1467/2. (You get the denominator by taking the number of data points and subtracting 2: 4 - 2 = 2.)
13. Press Enter. You should see 8.2809 (to 4 decimal places).
14. Press the times key and enter 1.9. Press Enter. You should see 15.7337.
15. Press clear. Press 2nd VAR-LINK.
16. Arrow down to resid (it is below STAT VARS). Press Enter. Press Enter again.
17. Arrow up to the list. Scroll through the list using the arrow keys.
18. Compare 15.7337 to the absolute values of the numbers in the list. If any absolute value is greater than or equal to 15.7337, then the corresponding point is an outlier.
19. Absolute values of the numbers in the list are approximately 5.59, 1.95, 2.31, 9.84.
20. None of them are greater than or equal to 15.7337.
21. Therefore, for this data set, no point is an outlier.

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Keywords are listed by the section with that keyword (page numbers are in parentheses). Keywords do not necessarily appear in the text of the page. They are merely associated with that section. *Ex.* apples, § 1.1 (1) **Terms** are referenced by the page they appear on. *Ex.* apples, 1

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