Collaborative Statistics: Practice Final Exam 2^*

Susan Dean Barbara Illowsky, Ph.D.

This work is produced by OpenStax-CNX and licensed under the Creative Commons Attribution License 3.0^{\dagger}

Abstract

This module is a practice final for an associated elementary statistics textbook, Collaborative Statistics, available for Fall 2008.

Exercise 1

(Solution on p. 11.)

A study was done to determine the proportion of teenagers that own a car. The population proportion of teenagers that own a car is the

A. statistic

- B. parameter
- C. population
- $\mathbf{D.}$ variable

The next two questions refer to the following data:

value	frequency
0	1
1	4
2	7
3	9
6	4

Table 1

Exercise 2 The box plot for the data is:

*Version 1.16: Jun 29, 2012 12:51 pm -0500 †http://creativecommons.org/licenses/by/3.0/



(Solution on p. 11.) If 6 were added to each value of the data in the table, the 15th percentile of the new list of values is:

- **A.** 6
- **B.** 1
- **C.** 7
- **D.** 8

The next two questions refer to the following situation:

Suppose that the probability of a drought in any independent year is 20%. Out of those years in which a drought occurs, the probability of water rationing is 10%. However, in any year, the probability of water rationing is 5%.

Exercise 4

What is the probability of both a drought and water rationing occurring?

A. 0.05 **B.** 0.01

C. 0.02

D. 0.30

Exercise 5

Which of the following is true?

A. drought and water rationing are independent events

B. drought and water rationing are mutually exclusive events

C. none of the above

The next two questions refer to the following situation:

Suppose that a survey yielded the following data:

Favorite Pie Type

gender	apple	pumpkin	pecan
female	40	10	30
male	20	30	10

Table 2

Exercise 6

(Solution on p. 11.)

(Solution on p. 11.)

Suppose that one individual is randomly chosen. The probability that the person's favorite pie is apple or the person is male is:

A. $\frac{40}{60}$ B. $\frac{60}{140}$ C. $\frac{120}{140}$ D. $\frac{100}{140}$

Exercise 7

Suppose H_o is: Favorite pie type and gender are independent. The p-value is:

A. ≈ 0

B. 1

C. 0.05

D. cannot be determined

The next two questions refer to the following situation:

Let's say that the probability that an adult watches the news at least once per week is 0.60. We randomly survey 14 people. Of interest is the number that watch the news at least once per week.

Exercise 8

Which of the following statements is FALSE?

A. $X \sim B(14, 0.60)$ **B.** The values for x are: $\{1, 2, 3, ..., 14\}$ C. $\mu = 8.4$ **D.** P(X = 5) = 0.0408

Exercise 9

Find the probability that at least 6 adults watch the news.

(Solution on p. 11.)

(Solution on p. 11.)

A. $\frac{6}{14}$ **B.** 0.8499 **C.** 0.9417 **D.** 0.6429

Exercise 10

(Solution on p. 11.)

The following histogram is most likely to be a result of sampling from which distribution?



- **A.** Chi-Square with df = 6
- **B.** Exponential
- C. Uniform
- **D.** Binomial

The ages of campus day and evening students is known to be normally distributed. A sample of 6 campus day and evening students reported their ages (in years) as: {18, 35, 27, 45, 20, 20}

Exercise 11

(Solution on p. 11.)

What is the error bound for the 90% confidence interval of the true average age?

- **A.** 11.2
- **B.** 22.3
- **C.** 17.5
- **D.** 8.7

Exercise 12

(Solution on p. 11.) If a normally distributed random variable has $\mu=0$ and $\sigma=1$, then 97.5% of the population values lie above:

- **A.** -1.96 **B.** 1.96
- **C.** 1
- **D.** -1

The next three questions refer to the following situation:

The amount of money a customer spends in one trip to the supermarket is known to have an exponential distribution. Suppose the average amount of money a customer spends in one trip to the supermarket is \$72.

Exercise 13

What is the probability that one customer spends less than \$72 in one trip to the supermarket?

A. 0.6321 **B.** 0.5000 **C.** 0.3714 **D.** 1

Exercise 14

(Solution on p. 11.)

(Solution on p. 11.)

How much money altogether would you expect next 5 customers to spend in one trip to the supermarket (in dollars)?

A. 72 **B.** $\frac{72^2}{5}$ **C.** 5184

D. 360

Exercise 15

(Solution on p. 11.)

If you want to find the probability that the mean of 50 customers is less than \$60, the distribution to use is:

- A. N(72, 72)**B.** $N\left(72, \frac{72}{\sqrt{50}}\right)$ **C.** Exp (72)
- **D.** Exp $\left(\frac{1}{72}\right)$

The next three questions refer to the following situation:

The amount of time it takes a fourth grader to carry out the trash is uniformly distributed in the interval from 1 to 10 minutes.

Exercise 16

(Solution on p. 11.)

What is the probability that a randomly chosen fourth grader takes more than 7 minutes to take out the trash?

A. $\frac{3}{9}$ B. $\frac{7}{9}$ C. $\frac{3}{10}$ D. $\frac{7}{10}$

Exercise 17

(Solution on p. 11.)

Which graph best shows the probability that a randomly chosen fourth grader takes more than 6 minutes to take out the trash given that he/she has already taken more than 3 minutes?



(Solution on p. 11.)

We should expect a fourth grader to take how many minutes to take out the trash?

- **A.** 4.5
- **B.** 5.5
- **C.** 5
- **D.** 10

The next three questions refer to the following situation:

At the beginning of the quarter, the amount of time a student waits in line at the campus cafeteria is normally distributed with a mean of 5 minutes and a standard deviation of 1.5 minutes.

Exercise 19

What is the 90th percentile of waiting times (in minutes)?

- **A.** 1.28
- **B.** 90
- **C.** 7.47

D. 6.92

Exercise 20

The median waiting time (in minutes) for one student is:

- **A.** 5
- **B.** 50
- **C.** 2.5
- **D.** 1.5

Exercise 21

(Solution on p. 11.)

Find the probability that the average wait time of 10 students is at most 5.5 minutes.

A. 0.6301B. 0.8541C. 0.3694

(Solution on p. 11.)

D. 0.1459

Exercise 22

(Solution on p. 11.)

(Solution on p. 11.)

(Solution on p. 11.)

A sample of 80 software engineers in Silicon Valley is taken and it is found that 20% of them earn approximately \$50,000 per year. A point estimate for the true proportion of engineers in Silicon Valley who earn \$50,000 per year is:

A. 16 **B.** 0.2

C. 1

D. 0.95

Exercise 23

If $P(Z < z_{\alpha}) = 0.1587$ where $Z \sim N(0, 1)$, then α is equal to:

A. -1
B. 0.1587
C. 0.8413
D. 1

Exercise 24

A professor tested 35 students to determine their entering skills. At the end of the term, after completing the course, the same test was administered to the same 35 students to study their improvement. This would be a test of:

- A. independent groups
- **B.** 2 proportions
- C. matched pairs, dependent groups
- **D.** exclusive groups

Exercise 25

(Solution on p. 11.)

A math exam was given to all the third grade children attending ABC School. Two random samples of scores were taken.

	n	\overline{x}	s
Boys	55	82	5
Girls	60	86	7

Table 3

Which of the following correctly describes the results of a hypothesis test of the claim, "There is a difference between the mean scores obtained by third grade girls and boys at the 5 % level of significance"?

- A. Do not reject H_o . There is insufficient evidence to conclude that there is a difference in the mean scores.
- **B.** Do not reject H_o . There is sufficient evidence to conclude that there is a difference in the mean scores.
- C. Reject H_o . There is insufficient evidence to conclude that there is no difference in the mean scores.
- **D.** Reject H_o . There is sufficient evidence to conclude that there is a difference in the mean scores.

(Solution on p. 12.)

In a survey of 80 males, 45 had played an organized sport growing up. Of the 70 females surveyed, 25 had played an organized sport growing up. We are interested in whether the proportion for males is higher than the proportion for females. The correct conclusion is:

- **A.** There is insufficient information to conclude that the proportion for males is the same as the proportion for females.
- **B.** There is insufficient information to conclude that the proportion for males is not the same as the proportion for females.
- **C.** There is sufficient evidence to conclude that the proportion for males is higher than the proportion for females.
- **D.** Not enough information to determine.

Exercise 27

(Solution on p. 12.)

Note: Chi-Square Test of a Single Variance; Not all classes cover this topic. From past experience, a statistics teacher has found that the average score on a midterm is 81 with a standard deviation of 5.2. This term, a class of 49 students had a standard deviation of 5 on the midterm. Do the data indicate that we should reject the teacher's claim that the standard deviation is 5.2? Use $\alpha = 0.05$.

A. Yes

B. No

C. Not enough information given to solve the problem

Exercise 28

(Solution on p. 12.)

Note: F Distribution Test of ANOVA; Not all classes cover this topic. Three loading machines are being compared. Ten samples were taken for each machine. Machine I took an average of 31 minutes to load packages with a standard deviation of 2 minutes. Machine II took an average of 28 minutes to load packages with a standard deviation of 1.5 minutes. Machine III took an average of 29 minutes to load packages with a standard deviation of 1 minute. Find the p-value when testing that the average loading times are the same.

- **A.** the p-value is close to 0
- **B.** p-value is close to 1
- C. Not enough information given to solve the problem

The next three questions refer to the following situation:

A corporation has offices in different parts of the country. It has gathered the following information concerning the number of bathrooms and the number of employees at seven sites:

Number of employees x	650	730	810	900	102	107	1150
Number of bathrooms y	40	50	54	61	82	110	121

Table 4

Exercise 29

(Solution on p. 12.)

Is the correlation between the number of employees and the number of bathrooms significant?

A. Yes

B. No

C. Not enough information to answer question

The linear regression equation is:

A. $\hat{y} = 0.0094 - 79.96x$ **B.** $\hat{y} = 79.96 + 0.0094x$ **C.** $\hat{y} = 79.96 - 0.0094x$ **D.** $\hat{y} = -0.0094 + 79.96x$

Exercise 31

If a site has 1150 employees, approximately how many bathrooms should it have?

A. 69

B. 91

C. 91,954

D. We should not be estimating here.

Exercise 32

Note: Chi-Square Test of a Single Variance; Not all classes cover this topic. Suppose that a sample of size 10 was collected, with $\overline{x} = 4.4$ and s = 1.4.

 $H_o: \sigma^2 = 1.6$ vs. $H_a: \sigma^2 \neq 1.6$. Which graph best describes the results of the test?



Exercise 33

(Solution on p. 12.)

64 backpackers were asked the number of days their latest backpacking trip was. The number of days is given in the table below:

# of days	1	2	3	4	5	6	7	8
Frequency	5	9	6	12	7	10	5	10

Table 5

Conduct an appropriate test to determine if the distribution is uniform.

- A. The p-value is > 0.10. There is insufficient information to conclude that the distribution is not uniform.
- **B.** The p-value is < 0.01. There is sufficient information to conclude the distribution is not uniform.
- C. The p-value is between 0.01 and 0.10, but without alpha (α) there is not enough information
- **D.** There is no such test that can be conducted.

(Solution on p. 12.)

(Solution on p. 12.)

(Solution on p. 12.)

Note: F Distribution test of One-Way ANOVA; Not all classes cover this topic. Which of the following statements is true when using one-way ANOVA?

A. The populations from which the samples are selected have different distributions.

- **B.** The sample sizes are large.
- C. The test is to determine if the different groups have the same means.
- **D.** There is a correlation between the factors of the experiment.

Solutions to Exercises in this Module

Solution to Exercise (p. 1) B: parameter Solution to Exercise (p. 1) А Solution to Exercise (p. 2) C: 7 Solution to Exercise (p. 2) C: 0.02 Solution to Exercise (p. 3) C: none of the above Solution to Exercise (p. 3) D: $\frac{100}{140}$ Solution to Exercise (p. 3) A: ≈ 0 Solution to Exercise (p. 3) B: The values for x are: $\{1, 2, 3, ..., 14\}$ Solution to Exercise (p. 3) C: 0.9417 Solution to Exercise (p. 4) D: Binomial Solution to Exercise (p. 4) D: 8.7 Solution to Exercise (p. 4) A: -1.96 Solution to Exercise (p. 5) A: 0.6321 Solution to Exercise (p. 5) D: 360 Solution to Exercise (p. 5) B: $N\left(72, \frac{72}{\sqrt{50}}\right)$ Solution to Exercise (p. 5) A: $\frac{3}{9}$ Solution to Exercise (p. 5) D Solution to Exercise (p. 6) B: 5.5 Solution to Exercise (p. 6) D: 6.92 Solution to Exercise (p. 6) A: 5 Solution to Exercise (p. 6) B: 0.8541 Solution to Exercise (p. 7) B: 0.2 Solution to Exercise (p. 7) A: -1 Solution to Exercise (p. 7) C: matched pairs, dependent groups

Solution to Exercise (p. 7) D: Reject H_o . There is sufficient evidence to conclude that there is a difference in the mean scores. Solution to Exercise (p. 8) C: There is sufficient evidence to conclude that the proportion for males is higher than the proportion for females. Solution to Exercise (p. 8) B: No Solution to Exercise (p. 8) B: p-value is close to 1. Solution to Exercise (p. 8) B: No Solution to Exercise (p. 9) C: $\hat{y} = 79.96x - 0.0094$ Solution to Exercise (p. 9) D: We should not be estimating here. Solution to Exercise (p. 9) Α Solution to Exercise (p. 9) A: The p-value is > 0.10. There is insufficient information to conclude that the distribution is not uniform. Solution to Exercise (p. 10)

C: The test is to determine if the different groups have the same means.