Quadratic Homework – Quadratic Inequalities*

Kenny M. Felder

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Abstract

Introduction to quadratic inequalities.

The first part of this assignment is brought to you by our unit on **functions**. In fact, this part is entirely recycled from that unit.

Exercise 1

The following graph shows the temperature throughout the month of March. Actually, I just made this graph up—the numbers do not actually reflect the temperature throughout the month of March. We're just pretending, OK?

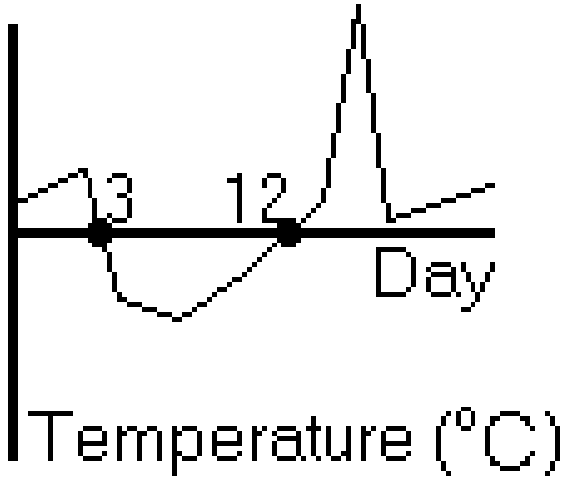

Figure 1

*Version 1.2: Nov 8, 2010 1:45 pm +0000

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a. On what days was the temperature exactly 0°C?
b. On what days was the temperature below freezing?
c. On what days was the temperature above freezing?
d. What is the domain of this graph?
e. During what time periods was the temperature going up?
f. During what time periods was the temperature going down?

Exercise 2
The following graph represents the graph $y = f(x)$.

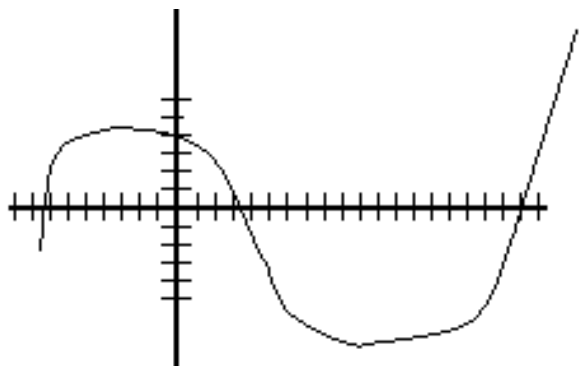

Figure 2

a. Is it a function? Why or why not?
b. What are the zeros?
c. For what x-values is it positive?
d. For what x-values is it negative?
e. Draw the graph $y = f(x) - 2$.
f. Draw the graph $y = -f(x)$

OK, your memory is now officially refreshed, right? You remember how to look at a graph and see when it is zero, when it is below zero, and when it is above zero.

Now we get to the actual "quadratic inequalities" part. But the good news is, there is nothing new here! First you will graph the function (you already know how to do that). Then you will identify the region(s) where the graph is positive, or negative (you already know how to do that).

Exercise 3
$x^2 + 8x + 15 > 0$

a. Draw a quick sketch of the graph by finding the zeros, and noting whether the function opens up or down.
b. Now, the inequality asks when that function is >0—that is, when it is positive. Based on your graph, for what x-values is the function positive?
c. Based on your answer to part (b), choose one x-value for which the inequality **should** hold, and one for which it should **not**. Check to make sure they both do what they should.

Exercise 4
A flying fish jumps from the surface of the water with an initial speed of 4 feet/sec.

a. Write the equation of motion for this fish.
b. Find the zeros of the graph, and graph it.
c. Based on your graph, answer the question: during what time interval was the fish **above** the water?
d. During what time interval was the fish **below** the water?
e. At what time(s) was the fish exactly at the level of the water?
f. What is the maximum height the fish reached in its jump?