Read each problem carefully. Remember to show all work in a logical and legible manner. To receive credit, all answers must follow logically from the work that you show on your exam.

1. [8] Suppose that \( f(x) = -3x^2 + 2x - 1 \) and \( g(x) = x + 4 \). Which of the following functions represents \((f \circ g)(x)\)?
   a. \( y = -3x^2 + 2x + 3 \)
   b. \( y = -3x^2 - 22x - 41 \)
   c. \( y = -3x^2 - 22x - 49 \)
   d. \( y = -3x^2 + 2x - 41 \)
   e. \( y = -3x^2 + 2x - 49 \)

2. [8] Which two of the lines listed below meet at a right angle at \((-3,4)\)? (Make sure you choose TWO answers.)
   a. \( y = -\frac{4}{3}x + 8 \)
   b. \( y = \frac{5}{2}x + \frac{23}{2} \)
   c. \( y = \frac{3}{4}x + \frac{25}{4} \)
   d. \( y = -\frac{3}{4}x + \frac{7}{4} \)
   e. \( y = -\frac{2}{5}x + \frac{14}{5} \)

3. [8] Which of the following functions are even functions? Choose all that apply.
   a. \( f(x) = -|3x| + 2 \)
   b. \( f(x) = x^2 + 4x - 12 \)
   c. \( f(x) = \sqrt{x} + 16 \)
   d. \( f(x) = -x^6 - 13 \)
   e. \( f(x) = \frac{2}{3} \)
4. [8] Given that \( f(x) = \mid -6 - 3.1x \mid \), find \( f(11) \)
   a. 40
   b. -40
   c. 40.1
   d. -41
   e. -40.1

5. [8] Factor \( f(x) = 3x^3 + 13x^2 + 16x + 4 \), given that \( x = -2 \) is a zero of \( f(x) \).
   a. \( f(x) = (x - 4)(x + 1)(x + 2) \)
   b. \( f(x) = (3x^2 + 7x + 2)(x + 2) \)
   c. \( f(x) = (x - 8)(12x^2 + 185x + 1414) \)
   d. \( f(x) = (3x + 7)(x - 2) + 2 \)
   e. \( f(x) = (3x^2 + 19x + 54)(x - 2) + 112 \)

6. [13] SFA Gardens wants to construct a fence to surround one of their garden plots. One side of the plot borders Lanana Creek, and will not be fenced. Local businesses have donated 520 feet of fencing for the project. Do the following, using the diagram to help you visualize the problem.

   a. Create a quadratic model that expresses the area in terms of the width \( x \)

   b. Find the vertex of the quadratic model you created in part a

   c. Interpret the meaning of the vertex in the context of this problem
7. [15] The graph of a function \( f(x) \) is given below. Answer the following (use interval notation)

   a. Give the interval(s) over which the function is INCREASING

   b. Give the interval(s) over which the function is DECREASING

   c. Give the DOMAIN of the function

   d. Give the RANGE of the function

8. [10] Find a quadratic function \( f(x) \) whose graph matches the one shown at right.

\[ f(x) = -2(x + 3)^2 + 5 \]
9. [12] For the function whose graph is given, find the following:
   a. Identify the parent function

   b. List the transformations (in order) on the parent function that create this graph

   c. Give the equation for this graph

10. [10] Find the piecewise function whose graph is given below: