This test is take-home, so you may use your notes, book, Excel, MathGV, etc. This test is due back to me at the beginning of class on Monday, December 7, 2009. Late tests will not be accepted. Don’t forget to simplify all of your answers and attach your work!

1. Find the vertices of the functions:
   a) \( f(x) = 3x^2 - 42x + 50 \)
   \((7, -97)\)
   b) \( f(x) = -2.9(x - 1.5)^2 - 3.8 \)
   \((1.5, -3.8)\)

2. Graph the following function: \( f(x) = 2x^2 - 8x + 5 \)

3. Solve for \( x \), if possible: \( 3(x + 7)^2 = 13 \)
   \( x \approx -4.9183, -9.0817 \)

4. Graph the following function: \( f(x) = -(x + 1)^2 + 4 \)

5. Given the graph of the quadratic equation at the right, find:
   a) the vertex of the equation \((-2, -1)\)
   b) \( f(0) = 7 \)
   c) the equation of the parabola \( y = 2(x + 2)^2 - 1 \)
   d) the x-intercepts of the equation \(-1.2929, -2.7071\)
6. Find the equation of the parabola that has a vertex of $(3, -8)$ and passes through the point $(2, -3)$.

$$y = 5(x - 3)^2 - 8$$

7. Find the equation of the parabola that fits the given data.

<table>
<thead>
<tr>
<th>$x$</th>
<th>$y$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>-1.5</td>
</tr>
<tr>
<td>3</td>
<td>-2</td>
</tr>
<tr>
<td>4</td>
<td>-1.5</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

$$y = 0.5(x - 3)^2 - 2$$

8. A cork is shot out of a bottle of champagne vertically upward with a velocity of 64 feet per second from a table top that is 3 feet off of the floor. Use the formula $h(t) = -16t^2 + v_0t + h_0$ to answer the following questions.

a) Find the equation $h(t)$ that represents the height of the cork after $t$ seconds.

$$h(t) = -16t^2 + 64t + 3$$

b) How high is the cork after 3 seconds? c) How long does it take for the cork to hit the floor?

51 feet about 4.0463 seconds

d) What is the maximum height the cork reaches?

67 feet

9. Augusta Tech is planning on building a garden whose area will be 120 ft$^2$. If the perimeter of the garden will use 46 feet of fencing, what are the dimensions of the garden?

8 feet by 15 feet

10. Natural gas used in a particular region in millions of cubic feet from 1980 to 2000 can be modeled by the function $G(x) = 0.016x^2 - 0.368x + 22.1$, where $x$ represents years after 1980.

a) How many millions of cubic feet were used in 1986? b) During what year was the minimum amount of natural gas used in the region?

20.468 ft$^3$ 1991

c) During what years did the amount of natural gas used equal 20.5 million cubic feet?

1985 and 1997