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 Tuesday, September 8, 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) \( f(x) = 5x^2 + 30x + 43 \)
   b) \( f(x) = 8.4(x - 7.2)^2 + 4.1 \)

2. Graph the following function: \( f(x) = x^2 + 6x + 7 \)

3. Solve for \( x \), if possible: \( 2(x - 5)^2 = 17 \)

4. Graph the following function: \( f(x) = 3(x - 2)^2 - 5 \)

5. Given \( f(x) = 7x - 9 \) and \( g(x) = 2x + 3 \), find the following.
   a) \( (f + g)(x) \)
   b) \( (f - g)(x) \)
   c) \( (g \circ f)(x) \)
   d) \( (f \cdot g)(x) \)

9. Given the graph of the quadratic equation at the right, find:
   a) the vertex of the equation ______________________
   b) \( f(-2) = \) _______
   c) the equation of the parabola _________________________
   d) the \( x \)-intercepts of the equation ____________, ____________
10. Find the equation of the parabola that has a vertex of \((-2, -7)\) and passes though the point \((0, -5)\).

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

<table>
<thead>
<tr>
<th>x</th>
<th>y</th>
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<tbody>
<tr>
<td>2</td>
<td>-11</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
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<tr>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>-11</td>
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</tbody>
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12. A ball is thrown vertically upward with a velocity of 72 feet per second from the top of a building that is 108 feet tall. 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 ball after \(t\) seconds.

b) How high is the ball after 2 seconds?  
c) How long does it take for the ball to hit the ground?

d) After how many seconds does it take for the ball to pass the edge of the building on its way down?  
e) What is the highest distance the ball reaches?

13. Sam and Susie’s living room has an area of 270 feet\(^2\). The length of the room is 3 feet longer than the width.

a) What are the dimensions of the room?  
b) If Sam and Susie extend their living room so that the length and width of the room are 5 feet longer than it is currently, what would be the new area of the room?

14. Assume that the sales for a newly released DVD can be modeled by the equation \(S(x) = -4x^2 + 16x + 30\), where \(S(x)\) represents the thousands of DVDs sold \(x\) weeks after the release of the DVD.

a) When do we expect the sales to reach their peak?  
b) How many DVD sales do we expect during the peak week?  
c) After how many weeks do we expect there to be no sales at all?

d) How many sales do we expect to have during week 3?