Math 371 ASSIGNMENT 10, WINTER 2016 **Due at the start of class on 2/8.**

We will be working with equations of the form $y = ax^2 + bx + c$. Recall(?) a few things about such equations:

- The graph of the equation is a parabola. It opens upward if a is positive and downward if a is negative. The **vertex** of the parabola is the lowest or highest point on the parabola, depending on whether it opens up or down, respectively.
- If a is positive, then there is a minimum value of y at the vertex of the parabola. If a is negative there is a maximum value of y at the vertex of the parabola.
- The x-coordinate of the vertex of the parabola is given by $x = -\dfrac{b}{2a}$. The y-coordinate of the vertex is obtained by substituting that value of x into the equation $y = ax^2 + bx + c$.

1. Consider the equation $y = -0.1x^2 + 4.6x + 265$.
   (a) Write a sentence describing what the graph of this equation would look like, and how that tells us whether y has a minimum value, or a maximum value.
   (b) Determine the minimum or maximum value of y and the value of x for which it occurs, **each rounded to the nearest whole number. Show work** and check your answer by graphing the equation on *Desmos* or a graphing calculator.

There's more on the back!

1. (c) **Conclude with a sentence** of the form "y has a maximum/minimum value of _____ at $x =$ _____.

We will also need to solve equations of the form $ax^2 + bx + c = 0$. We can occasionally do this by factoring, but usually we'll use the quadratic formula

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

which you certainly have seen before!

2. (a) Use the quadratic formula to solve the equation

$$6x^2 - 117x + 462 = 0.$$

   You should get two answers, one for the $+$ in the equation and one for the $-$ in the equation.
   (b) Check your answers by "plugging them into" the equation to see if they make it true.

3. Consider again the equation $y = -0.1x^2 + 4.6x + 265$, and suppose that we wish to find all values of x for which $y = 100$. Do this as follows: (1) Substitute the value of 100 into the equation for y. (2) To apply the quadratic formula we must first get zero on one side of the equation. I would suggest moving everything to the left side of the equation, although you could instead move the 100 to the right side. (3) Use the quadratic formula to solve the resulting equation, **rounding your answers to the nearest whole number.**