## Math 1010 - Quiz 10

University of Utah

Fall 2009

Name: Solutions

- 1. Find the solutions to the quadratic equations:
  - (a) (4 points)

$$4x^2 + 6x + 1 = 0.$$

$$x = \frac{-6 \pm \sqrt{6^2 - 4(4)(1)}}{2(4)} = \frac{-6 \pm \sqrt{20}}{8} = \frac{-6 \pm 2\sqrt{5}}{8} = \frac{-3 \pm \sqrt{5}}{4}.$$

(b) (4 points)

$$x^2 - 8x + 19 = 0.$$

$$x = \frac{-(-8) \pm \sqrt{(-8)^2 - 4(1)(19)}}{2(1)} = \frac{8 \pm \sqrt{-12}}{2} = 4 \pm \sqrt{-3} = 4 \pm i\sqrt{3}.$$

2. Find the vertex of the parabola: (2 points)

$$y = x^2 - 4x + 8$$

*Hint* - x = -b/(2a).

$$x = \frac{-(-4)}{2(1)} = 2$$
$$y = 2^2 - 4(2) + 8 = 4.$$

So,

The vertex is at 
$$(2, 4)$$
.

3. Solve the quadratic inequality: (That is, find all values of *x* for which the inequality is true.) (5 points)

$$x^2 - 6x + 10 \le 2.$$

First, we move everything to one side to get:

$$x^2 - 6x + 8 \le 0.$$

Then, we find the roots of our polynomial on the left to figure out our points of interest:

$$x^{2} - 6x + 8 = (x - 2)(x - 4) = 0$$
  
So,

x = 2 and x = 4 are our points of interest.

Then, we check to determine whether our function is positive or negative within these intervals. Say, at the points 0, 3, and 5.

$$f(x) = x^{2} - 6x + 8;$$
  

$$f(0) = 8,$$
  

$$f(3) = 9 - 18 + 8 = -1,$$
  

$$f(5) = 25 - 30 + 8 = 3.$$

So, our function is less than or equal to zero between 2 and 4.

 $x \le 2 \le 4.$