1. (20 total points) Simplify the following expressions.

   (a) $\left(\frac{3x}{y^2}\right)^{-3}$

   (b) $(4x)^{\frac{1}{2}}(5x^{\frac{1}{2}})^3$

   (c) $(2x+3)(x^2-2)+(x-1)^2$ (write your answer as a polynomial expression)

2. (20 total points) Consider the line in the xy-plane that goes through the points $(3, 2)$ and $(-3, 0)$.

   (a) Find the slope of this line.

   (b) Write the equation of the line in point-slope form.

   (c) Find the y-intercept.

3. (20 points total) Consider the quadratic equation

$$x^2 - 6x - 2 = 0$$

(a) Find the discriminant of this quadratic and use it to determine how many solutions there are to this equation.

(b) Solve this equation by completing the square.

4. (20 points total) Solve the following inequalities.

(a) $-4x - 2 \geq 6$

(b) $|3x + 1| < 7$

5. (20 points total) Let $A = (1, 2)$ and let $B = (3, 4)$.

   (a) Find the distance between these two points.

   (b) Find the equation of the circle with center A that goes through the point B. (*Hint: you already know the radius.*)