Math 107 Fall 2011 - Exam 2

Show all work. No points will be given for answers without proper mathematical justification. Simplify all answers. No calculators or other electronic devices are allowed. Good luck!

1. (10pts) Solve the following equations:
   (a) \( \frac{1}{2}x + 2(x - 3) = 3x + 1 \)
   (b) \( x^2 - 3x = 5 \)

2. (15pts) Solve the following equations:
   (a) \( \frac{x}{x - 2} + \frac{2}{x + 3} = \frac{10}{(x - 2)(x + 3)} \)
   (b) \( x^4 = 9x^2 \)
   (c) \( x^3 - 6x^2 + 8x = 0 \)

3. (6pts) For points \( A(2, 5) \), and \( B(6, -1) \):
   (a) find the distance between \( A \) and \( B \)
   (b) find the midpoint of the line segment \( AB \)

4. (4pts) Find the equation of a line in slope-intercept form \( y = mx + b \) passing through \((-2, 3)\) and \((2, -5)\).

5. (5pts) Find an equation of a line that passes through point \((0,2)\) and is perpendicular to line \(5x - 3y = 1\).

6. (3pts) Find an equation of a line that passes through point \((3,8)\), and is parallel to the line \( y = -1 \).

7. (5pts) Find the equation of a quadratic function in standard form \( y = a(x - h)^2 + k \) that has the vertex at \((1,2)\), and is passing through point \((0,14)\).

8. (6pts) Sketch the graphs of the given functions:
   (a) \( f(x) = -\sqrt{x - 3} \)  
   (b) \( g(x) = |x + 2| - 4 \)

9. (8pts) Given the equation of a circle: \( x^2 + (y + 1)^2 = 5 \)
   (a) find the center and radius of the circle
   (b) find the the \( x \)-intercepts and \( y \)-intercepts of the equation

10. (10pts) Sketch the graph of function \( y = (x - 2)^2 - 16 \). Find and label the vertex, the \( x \)-intercepts, and the \( y \)-intercept.

11. (12pts) For the given polynomial functions find the zeros, the multiplicity of each zero, \( y \)-intercept, and sketch the graph of each function
   (a) \( f(x) = x^2(x - 7) \)  
   (b) \( g(x) = -2(x - 1)^3(x + 5) \)

12. (16pts) Find the equation of the vertical asymptote(s), the equation of the horizontal asymptote, \( x \)-intercept(s), \( y \)-intercept, and then sketch the graph of each rational function:
   (a) \( f(x) = \frac{x + 2}{x - 3} \)  
   (b) \( g(x) = \frac{x + 1}{x^2 - 4} \)