Math 111   Exam 1 Part II, Winter 2013   **Name:** _____

Except where noted otherwise, each numbered exercise is worth six points. Be sure to label all answers to word problems with units.

1. Solve the equation $x^3 = 2x^2 + 15x$.

2. Given that $f(x) = x^2 - 3x + 2$, find $f(x+5)$.

3. $f(x) = \sqrt{x+7} - x$. Find all values of x for which the function has value 5. **Show how you get your answer, and be sure to check your answer(s).**

4. Use the graph below and to the right, for a function f, to answer the following. **Assume that the right end of the graph remains above the x-axis, and that the left end keeps going as indicated. You may have to approximate some values - don't agonize over a small amount!** *Each part is worth 2 points*

    (a) Give the value or values of $f(1)$: _____

    (b) Give all values of x such that $f(x) = 1$.

    (c) Give all intervals on which the function is increasing.

    (d) Give all intervals on which the function is positive.
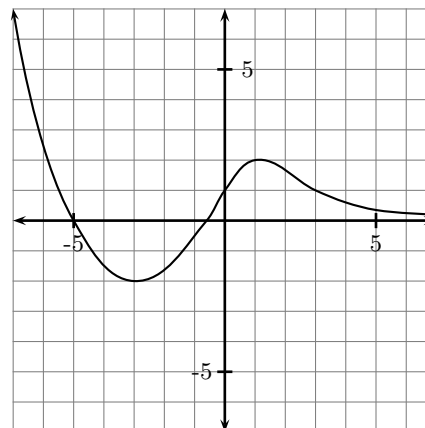
    (e) For each of the following, fill in the first blank with either *relative* or *absolute*, the second blank with either *maximum* or *minimum*, and the last two blanks with numbers. **Use "absolute" when possible.**

        The function has a(n) _____ _____ of _____ at _____.

        The function has a(n) _____ _____ of _____ at _____.

5. Give the domain of each function, using any notation you wish.

    (a) $f(x) = \dfrac{1}{x^2 - 3x + 2}$ _____

    (b) $h(x) = \sqrt{4 - x^2}$ _____

6. Consider the equation $ax + b = cx + d$.

    (a) Solve for c.   (b) Solve for x.

7. The length of a rectangle is two inches less than three times the width, and the perimeter is 52 inches. Set up an equation and use it to determine the length and width. Show your work in the space below.

length = _____   width = _____

8. Solve **EXACTLY ONE** of the following equations, without using the quadratic formula. **Show all steps!**

- $x^2 + \dfrac{1}{3}x = \dfrac{1}{6}$

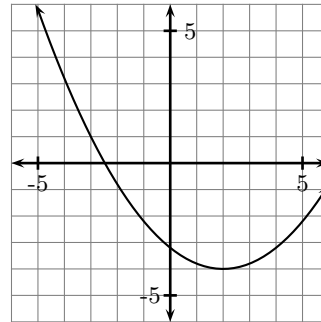- $\dfrac{x+4}{x^2+5x} = \dfrac{-2}{x^2-25}$

- $x = \sqrt{2x-2} + 1$

Do **EXACTLY ONE** of the remaining exercises, using the space below for 10, 11 or 12. **Circle the number of the one you wish for me to grade.**

9. Give the domain and range of the functions whose graphs are shown in the blanks provided. You may give your answers in each case using interval notation, inequalities or words, whichever you prefer.
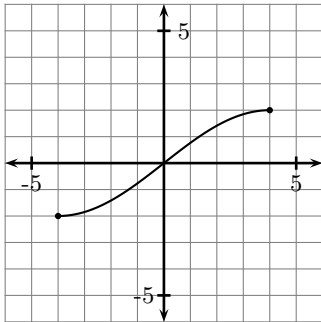
Domain: _____   Domain: _____

Range: _____   Range: _____

10. Consider the equation $|3x + 5| = a$, where a is some number.

   (a) Give a value of a for which the equation has no solution: $a = $ _____ *2 points*
   (b) Put in a value of a for which the equation has a solution, and solve it for that value. *4 points*

11. Suppose that $f(x) = 3x - 5$. Find and simplify $\dfrac{f(2 + h) - f(2)}{(2 + h) - 2}$. **Box your final answer.**

12. When a rock is thrown upward from a height of 4.3 feet with an initial velocity of 36 feet per second, it's height h (in feet) above the ground at any time t seconds after being thrown is $h = -16t^2 + 36t + 4.3$. When does the rock hit the ground? **Round your answer to the nearest tenth of second and give units with your answer.**