Math 110 - Section 3
Exam #1 - Sample study problems

Very important: These problems do not outline everything that will or will not be on the exam! They should be about as difficult as the exam problems and similar in flavor, however the goal of the exam is to test understanding - not regurgitation.

1. Recall the definition of a function: Something is a function if it assigns some value to each input.
   (a) Explain what the vertical line test is and how to use it.
   (b) Explain what it means if something fails the vertical line test.
   (c) If an equation is undefined for some values, can it still potentially pass the vertical line test?

2. For a piecewise function,

$$j(x) = \begin{cases} \sqrt{-2-x} & \text{if } x < 0 \\ x^3 - 2\sqrt{2x} & \text{if } 0 \leq x \leq 1 \\ \pi & \text{if } x > 1 \end{cases}$$

   (a) Find $j(-4)$:
   (b) Find $j(-1)$:
   (c) Find $j(1)$:
   (d) Find $j(5)$:

3. Evaluate the difference quotient $\dfrac{f(x+h)-f(x)}{h}$ for $f(x) = x^2 + x - 2$

4. Find the zeros and any places where the function might be undefined for

$$g(x) = \frac{x^2 - 3x + 2}{x^2 + 7x + 12}$$

   Use this information to write the domain of $g(x)$.

5. Give an example of an equation whose solution is not a function

6. Draw a graph of the function with your calculator and show your window

$$p(x) = 0.2x^3 - 6x^2 - 4x$$

7. Find the intervals on which the function from the previous problem is negative and the intervals on which it is decreasing

8. Is $f(x) = x^4 + 9$ even or odd?

9. A parking lot is being put up next to a building, using the building for one side of the parking lot. If the builders only have 250 ft. of fencing, what dimensions will give them the biggest parking lot?

10. Happy trails coffee supplies charges a signing fee of \$2000 upon establishing a contract and each pound of coffee costs \$1.35. Joe's Roasting Co charges \$3.10 per pound of coffee, but no signing fee. When does Happy trails become a better deal?

11. Can you find a function which is even and odd?

You should also review x and y intercepts, turning points, qualitative graphs, finding a good window with your calculator, geometry problems ("find a function for the diameter of a circle in terms of it's area", etc), problems of the form of example 7 and 8 in section 1.4, translations of graphs, and everything else we've covered.