MIDTERM 1 # Math 111 Practice

NAME: some additional topics such as even/odd functions and vertex form are missing

1. [6] TRUE/FALSE: Circle T in each of the following cases if the statement is *always* true. Otherwise, circle F. Let f be a function, and x, y, and z be positive real numbers with $z \neq 0$.

   T F $\frac{3x+y}{3z} = \frac{x+y}{z}$

   T F $(x+y)^2 = x^2 + y^2$

   T F $|x-y| = |y-x|$

   T F $f(x+y) = f(x) + f(y)$

   T F $2y^3 - 3x^2 = 5$ defines x as a function of y

   T F The function $\sqrt{(x-\sqrt{2})}$ has the domain $(\sqrt{2}, \infty)$

   Show your work for the following problems. The correct answer with no supporting work will receive NO credit (this includes multiple choice questions).

2. [2] Give the *definition* of the absolute value.

3. [4] Solve for x: $|x^2 + 3x - 6| = 2x$

4. [2] Given $\frac{1}{t} = \frac{2}{r} + \frac{1}{s}$, solve for r.

5. [2] For what value(s) of k does the equations $4x^2 - kx + 1 = 0$ have *one* solution?

6. [4] Consider the points $P = (3, 4)$ and $Q = (-1, -2)$. Find the equation to a line that goes through the point $(1, 1)$ and has a perpendicular slope to the line connecting P and Q.

   - [1] What is the y intercept of the line you found?

   - [1] What is the x intercept of the line you found?

7. Consider $f(x) = \frac{1}{x} + x$ and $g(x) = 2x^3 - 3x + 1$.

- [2] What is $g(z - h)$? Do *not* expand this.

- [2] What is $g(z + \sqrt{2})$? Do *not* expand this.

- [5] Compute and simplify the difference quotient for $f(x)$. Recall the difference quotient is:

$$\frac{f(x+h) - f(x)}{h}$$

8. [4] Given that $f(x) = -2x^2 - 4x + 1$

(a) Write f in vertex form.

(b) List the graph transformations in order that you would do to $y = x^2$ to obtain the graph of f:

(c) Graph f.

9. Given the graph below of $f(x)$, write, in order, the graph transformations of $f(x)$ necessary to obtain the following. Draw them.

   - [2] $g(x) = -2f(x)$

   - [2] $h(x) = f(x+1) + 1$

   - [3] $j(x) = \frac{1}{2}f(-x-1)$

10. [6] A concrete walk f uniform width is to be built around a circular pool. The radius of the pool is 12 meters, and enough concrete is available to cover 25π square meters. If all the concrete is to be used, how wide should the walk be?

    note: there is a computational error on the solution to this problem

11. Grab a word problem from 4.1 like #57

12. Oh, and a question about symmetry.