Math 118 Sample Midterm 1

Midterm 1 topics are the topics found in exercise Sets 1 through 5. The following practice problems are similar to those found on the midterm. They are just for practice and will not be collected.

1. Simplify these expressions:

a. $\left(\dfrac{3x^{1/2}y^{5/2}}{xy^2}\right)^{-2}$.

b. $\dfrac{\frac{1}{a}+\frac{1}{x}}{\frac{1}{a}-\frac{1}{x}}$.

c. $\dfrac{2+i}{2-i}$

d. If $f(x) = 1/(x-2)$, then simplify $(f(a+h)-f(a))/h$.

2. Solve these equations or inequalities:

a. $|2x+1| \leq 6$

b. $x^2+9x-4 \leq 0$

c. $\frac{1}{x}+\frac{2}{x-3} = 5$

d. $\frac{(1-x)(1+x)}{(2-x)^2} \geq 0$

3. Find the implied domain for these expressions:

a. $\dfrac{\sqrt{1+x^2}}{1-\sqrt{x-1}}$

b. $\dfrac{1}{x^2-2x+1}$

c. $\dfrac{1}{\sqrt{x^2+x-1}}$

d. If $f(x) = x^2-1$ and $g(x) = \frac{1}{x}$, find the domains of $f \circ g$, $g \circ g$, and $g \circ f$.

4. Graph these functions:

a. $3x^2-2x-5$

b. $-2(x-2)(x-3)(x+1)$

c. $(x-1)^2(x+2)^2$

d. $9x-32$

e. $1+\sqrt{1-x^2}$

f. $2 - |3 - x|$

5. Either find the inverse to the following functions or say why the inverse function does not exist:

a. $\dfrac{1}{1+|x|}$

b. $\dfrac{1}{1+x}$

c. $\dfrac{1}{1+x^2}$

d. $x^3 + 1$.

6. What is the equation of a circle in the plane with radius 4 with center at $(5, 2)$?

7. The graph of a function $f(x)$ is shown below.

a. Find the domain of $f(x)$ (approximate numbers are okay for these exercises).

b. Find the range of $f(x)$

c. Find and local maximums or local minimums.

d. Find any zeros.

e. Find the intervals where the function is increasing and where it is decreasing.

f. If this graph were a polynomial, what degree polynomial could it be?

g. What is the average rate of change for this function on $[-1, 0]$? What is the average rate of change for this function on $[0, 2]$?

h. Is the function $1 - 1$? If so, sketch the inverse function.