MA 100 MIDTERM SOLUTIONS

Disclaimer: These solutions may or may not be correct. Please check my work as well as yours when working with them!

(1) (5 pts) For what values of x is it true that $|x-1|<4$?

The distance between x and 1 is less than 4. Draw a number line and count 4 units in each direction away from 1 to find that $-3<x<5$.

(2) a) (5 pts) Simplify: $\dfrac{x^2+3x+2}{x^2-1}$

$$\frac{x^2+3x+2}{x^2-1}=\frac{(x+2)(x+2)}{(x+1)(x-1)}=\frac{x+2}{x-1}$$

b) (5 pts) Simplify: $\dfrac{6}{a+h}-\dfrac{6}{a}$

$$\frac{6}{a+h}-\frac{6}{a}=\frac{6a-6(a+h)}{a(a+h)}=\frac{6a-6a-6h}{a(a+h)}=\frac{-6h}{a(a+h)}$$

(3) (10 pts) Solve for x: $x^2-4x-1=0$.

(4) A rectangle is twice as long as it its wide. The area of the rectangle is 50 square inches.
a) (10 pts) Draw a diagram or write an equation describing this situation.

$l\cdot w=50$
$2w=l$
Or, draw a rectangle that is twice as long as it is wide and note that $l\cdot w=50$.

b) (10 pts) Find the width of the rectangle.

Substitute $2w$ for l in $l\cdot w=50$ to get:

$$2w^2=50$$

$$w^2=25$$

$$w=5$$

(5) (20 pts) The graph of a function $f(x)$ is shown on the left below.
a) What is $f(0)$? -2
b) For what values of x does $f(x)=2$? $x=1, x=4$.
c) For what values of x is $f(x)>2$? $x>4$
d) For what values of x is $f(x)$ decreasing? $1<x<3$.

(6) (10 pts) The graph of function $g(x)$ is shown on the right above. Guess the equation of $g(x)$.

$g(x)=-x^2$

(7) (10 pts) A line passes through the points $(-1, 4)$ and $(2, 2)$.
a) Find the slope of the line.

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{2-4}{2-(-1)} = \frac{-2}{3}$

b) Find the slope of a line perpendicular to the first line.

Slope $= -1/m = \frac{3}{2}$.

(8) (10 pts) The following table is taken from page 72 of the text. Does this table describe weight as a function of height? Why or why not?

Height	72 in.	60 in.	60 in.	63 in.	70 in.
Weight	180 lb	204 lb	120 lb	145 lb	184 lb

This table does not describe weight as a function of height because for the "input" height of 60 in. there are two different "outputs" – 204 lb and 120 lb.

Bonus (5 pts) Sketch the graph of the equation $x^2 + (y + 2)^2 = 4$.

This is the equation of a circle with radius $2 = \sqrt{4}$ and center $(0, -2)$.