Jacky Peterson-Math
MAT150- TEST #2

NAME Key

CHAPTER 1 SCORE ______/ CLASS HOUR;______

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PENCIL/PAPER SECTION - **Use Calculator to help you with numerical calculations only and to check your work. ALL WORK MUST BE SHOWN IN ORDER TO RECEIVE CREDIT!!!**

1. Find the domains (using algebra) of the following functions:

a. $f(x) = \dfrac{x-4}{x^2-x-6}$

Denomenator $\neq 0$

$x^2 - x - 6 \neq 0$

$(x-3)(x+2) \neq 0$

$x \neq 3 \quad x \neq -2$

a. Domain: $\mathbb{R};\ x \neq 3\ x \neq -2$ (5)

b. $f(x) = 2x^2 - x - 1$

no denomenator, no radecal

b. Domain: $\mathbb{R}$ (5)

c. $f(x) = \sqrt{4-5x}$

Radecand ≥ 0

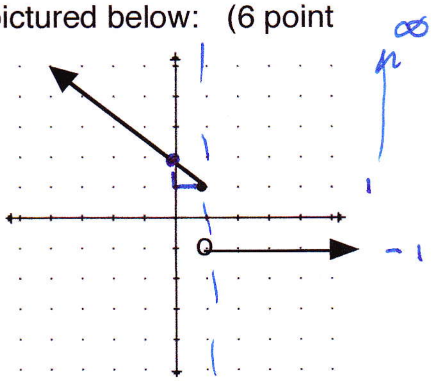
$4 - 5x \geq 0$

$-5x \geq -4$

$x \leq \frac{4}{5}$

c. Domain: $x \leq \frac{4}{5}$ (5)

2. The graph of a piecewise-defined function is given below. Find the formula for the function pictured below: (6 point



$$f(x) = \begin{cases} x+2 & \text{if } x \leq 1 \\ -1 & \text{if } x > 1 \end{cases}$$

$m = \frac{1}{1} = 1 \quad b = 2$

$y = mx + b$

$y = 1x + 2$

State the Domain: $\mathbb{R}$ (2)

State the Range: $\{-1\} \cup [1, \infty)$ (2)

What is the x-intercept if it exists: none (2)

What is the y-intercept if it exists: $(0, 2)$ (2)

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3. **Carefully** graph the following piecewise function:

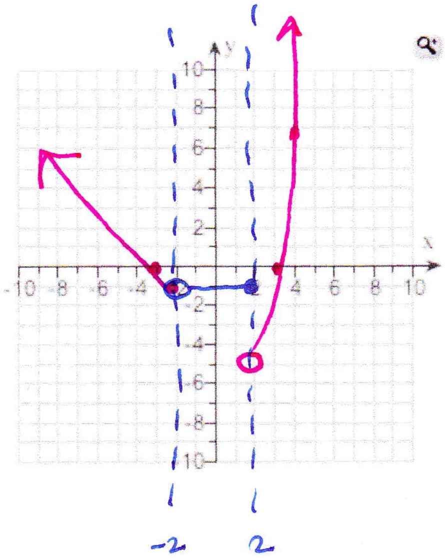
$$f(x)=\begin{cases} -x-3 & if \quad x\le -2 \\ -1 & if \quad -2<x\le 2 \\ x^2-9 & if \quad x>2 \end{cases}$$

$x \le -2$

X	$-x-3$
-2	-1
-3	0

$x > 2$

X	x^2-9
2	$4-9=-5$
3	$9-9=0$
4	$16-9=7$



a) Graph f(x)---------→(6 points)

b) Find the Domain of f(x): $\mathbb{R}$ (4)

c) Based on the graph find the range of f(x) $(-5, \infty)$ (3)

d) Locate the x and y intercepts:

Write your answer as (x,y) coordinate points

If no intercept exists state NONE

x-intercept(s) $(-3,0)$ $(3,0)$ (3)

y-intercept(s) $(0,-1)$ (3)

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4. Given: $f(x)=\dfrac{x^2-9}{x^2-2x+1}$

a) Find the domain of f(x). $\mathbb{R};\ x\neq 1$ (2)

$x^2-2x+1\neq 0$
$(x-1)\neq 0$
$x\neq 1$

a) f(–1) -2 (2)

$$\frac{(-1)^2-9}{(-1)^2-2(-1)+1} = \frac{1-9}{1+2+1} = \frac{-8}{4} = -2$$

b) x if f(x) = 1 5 (3)

$$\frac{x^2-9}{x^2-2x+1} = 1$$

$\cancel{x^2}-9 = \cancel{x^2}-2x+1$
$-10 = -2x$
$5 = x$

c) x-intercept(s) - If none state none $(\pm 3, 0)$ (3)
Write as (x,y) coordinate point (s) $y=0$

$$\frac{x^2-9}{x^2-2x+1} = 0$$

$x^2-9=0$
$x^2=9$
$x=\pm 3$

d) y-intercept - If none state none $(0,-9)$ (3)
Write as (x,y) coordinate points $x=0$

$$\frac{0^2-9}{0^2-2(0)+1} = \frac{-9}{1} = -9$$

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5. Describe in a step by step fashion how the complete graph $f(x) = -\frac{1}{2}\sqrt{(x+1)} - 4$ -1

can be obtained from the graph in step 1. **Note you may not need to use all the steps listed.**

Step 1: $y = \sqrt{x}$ (6 points)

Verbal description:

Step 2: left 1
Step 3: reflect x-axis
Step 4: V. Stretch factor of ½
Step 5: down 4
~~Step 6:~~ don't need

6. Given the following verbal description of a transformation, find an equation f(x) that represents it.

1: $y = x^2$
2. right 2 units $(x-2)^2$
3: reflect the x-axis $-(x-2)^2$
4: vertical stretch factor of 2 $-2(x-2)^2$
5: down 3 $-2(x-2)^2-3$

f(x) = $-2(x-2)^2-3$ (5)

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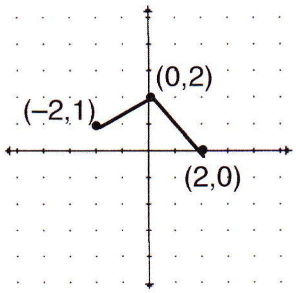
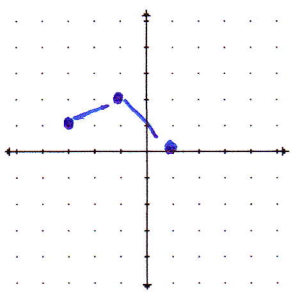
7. Given the following graph of a function. Sketch the graph of the following: (5 points each)





$f(x + 1)$

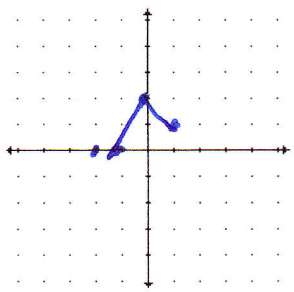
-1

Left 1

$x-1$

-1	X	Y
-3	-2	1
-1	0	2
1	2	0

New

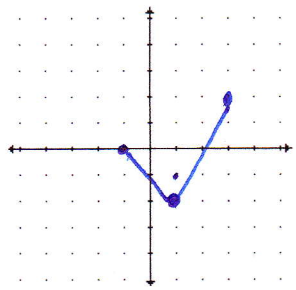


$f(-2x)$

$-\frac{1}{2} * x$ { Reflect y axis; h. Shrink factor of $\frac{1}{2}$

$* -\frac{1}{2}$	x	y
1	-2	1
0	0	2
-1	2	0

New



$-2f(x-1) + 2$

$+1$

right 1 $x+1$

reflect x-axis } $-2 * y$

V. Stretch factor of 2

up 2 → $+2$

$+1$	x	y	$* -2$	$+2$
-1	-2	1	-2	0
1	0	2	-4	-2
3	2	0	0	2

New

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8. Using the "4-step process" or some similar process and: $f(x) = \frac{1}{x}$

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

$\frac{-1}{x(x+h)}$ (8)

$f(x+h) = \frac{1}{x+h}$

$f(x) = \frac{1}{x}$

$f(x+h) - f(x) = \frac{1}{x+h} - \frac{1}{x}$

$= \frac{1\,x}{(x+h)x} - \frac{1\,(x+h)}{x(x+h)}$

$= \frac{x}{x(x+h)} - \frac{1(x+h)}{x(x+h)}$

$= \frac{x - 1(x+h)}{x(x+h)}$

$= \frac{x - x - h}{LCD} = \frac{-h}{LCD}$

$\frac{f(x+h) - f(x)}{h} = \frac{\cancel{-h}^{-1}}{LCD} \cdot \frac{1}{\cancel{h}} = \frac{-1}{x(x+h)}$