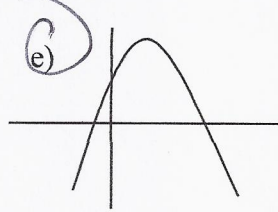
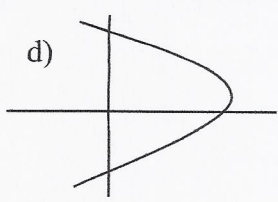


Show work where appropriate. Answers without adequate justification will not receive full credit.

1) (7pts) Circle the letter for each of the following which represent a function.

a)

x	5	7	9
f(x)	-1	4	4

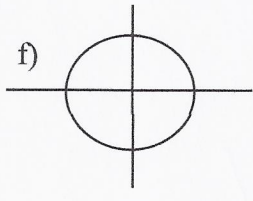


b)

x	5	7	7
g(x)	-1	4	6

c)

x	5	7	9
h(x)	-1	4	6



g) If any of the functions you circled are also one-to-one write the letter(s) here c

2) (7pts) The function f(x) is represented by the table below

x	-3	-2	-1	0	1	2	3
f(x)	6	2	1	-1	2	3	4

a) Evaluate f(-1)

1 f(-1) = 1

b) Solve f(x) = 2

-2 f(-2) = 2

c) Is f(x) one-to-one?

no

d) Find the average rate of change of f(x) on [0,2]

2

$$\frac{\Delta y}{\Delta x} = \frac{3 - (-1)}{2 - 0} = \frac{4}{2} = 2$$

3) (5pts) Given g(x) = 5x - x², evaluate & simplify

a) g(-3)

$$g(-3) = 5(-3) - (-3)^2 = -15 - 9 = -24$$

$$g(-3) = (-24)$$

b) g(x+2)

$$g(x+2) = 5(x+2) - (x+2)^2 = 5x+10 - (x^2+4x+4)$$

$$g(x+2) = 5x + 10 - (x^2 + 4x + 4) = -x^2 + x + 6$$

$$= -x^2 + x + 6$$

vertex = $(\frac{1}{2}, 6\frac{1}{4})$
 x = 2, (-2, 0)
 x = 3, (3, 0)

- 4) (3pts) A function $G=f(n)$ gives the number of tons of garbage, G , produced by n households in a month. Explain the meaning of $f(4)=9$ in words. (Answer in a complete sentence)

The number of tons of garbage produced by four (4) households in (1) month is (9) nine tons.

- 5) (5pts) Find and simplify the average rate of change of $g(x) = x^2 - 3x$ on the interval $[a, 1]$

$$\frac{\Delta y}{\Delta x} = \frac{g(1) - g(a)}{1 - a} = \frac{1^2 - 3(1) - (a^2 - 3a)}{1 - a} = \frac{1 - 3 - a^2 + 3a}{1 - a} = \frac{-2 - a^2 + 3a}{1 - a} = \frac{-(a^2 - 3a - 2)}{1 - a} = \frac{-(a-4)(a+1)}{-(a-1)} = \frac{(a-4)(a+1)}{a-1}$$

- 6) (10pts) Find the domain of $g(x)$. Find the domain & range of $f(x)$, the interval on which $f(x)$ is decreasing, and the interval on which $f(x)$ is concave up. Write your answers in interval notation.

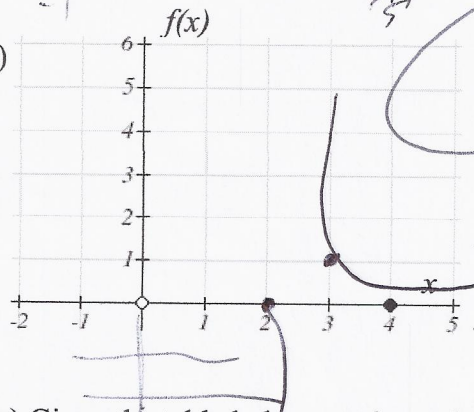
a) $g(x) = \frac{\sqrt{x-2}}{x-4}$ Domain of $g(x)$ $x \neq 4, x \geq 2$ $[2, 4) \cup (4, \infty)$

b) Domain of $f(x)$ $\{x \mid x \geq 2, x \neq 4, x > 4\}$

Range of $f(x)$ $(-1, 4]$

$f(x)$ is decreasing on: $[0, 2]$

$f(x)$ is concave up on: $[2, 4]$



- 7) (10pts) Given the table below, evaluate the following:

x	$f(x)$	$g(x)$
0	7	5
1	5	7
2	1	8
3	8	3
4	9	6
5	6	0
6	4	1
7	2	4
8	3	2
9	0	9

a. $f(g(3)) = 8$

b. $g(f(1)) = 0$

c. $f(f(2)) = 5$

d. $g^{-1}(4) = 7$

e. $f^{-1}(4) = 6$

$f(x) = 2\sqrt{x+4} - 4$ $g(x) = 2x^2 - 4$

8) (11pts) Given $f(x) = 2\sqrt{x+4}$ and $g(x) = 2x^2 - 4$

a) Evaluate $g(f(5))$

$$= 2(2\sqrt{5+4})^2 - 4$$

$= 2(2\sqrt{9})^2 - 4$
 $= 2(2 \times 3)^2 - 4$
 $= 2(6)^2 - 4$
 $= 2(36) - 4$
 $= 72 - 4 = 68$

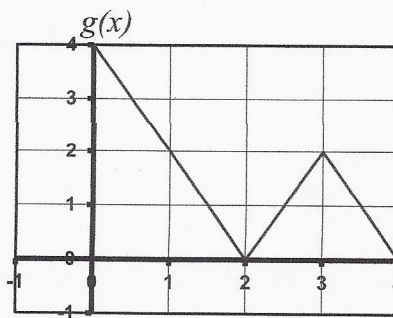
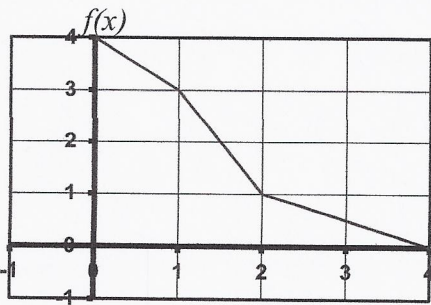
b) Find & Simplify $f(g(x))$

$$= 2\sqrt{2(5)^2 - 4} + 4 = 2\sqrt{2(25) - 4} + 4$$

c) What is the domain of $f(g(x))$

$2\sqrt{50} = 2\sqrt{2 \cdot 25}$
 $= 2 \cdot 5\sqrt{2} = 10\sqrt{2}$

9) (4pts) Based on the graphs shown below



a. Evaluate $f(g(3))$

b. Evaluate $f^{-1}(1)$

$f^{-1}(1) = 2$

10) (5pts) Suppose the function $P(t)$ gives the estimated population of a town t years after 2011. The function $N(c)$ gives the size of population that c police officers can patrol. Interpret (explain in plain English) the meaning of the statement $200 = N^{-1}(P(5))$

In 2016 the town will require 200 officers to patrol the area.

11) (4pts) If $f(x) = 350 + 15x$, find $f^{-1}(50)$

$g = 350 + 15x$
 $x = \frac{g - 350}{15}$
 $y = \frac{g - 350}{15}$

$f^{-1}(50) = \frac{50 - 350}{15} = \frac{-300}{15} = -20$

Compassion by 1/2 actually scale. horizontal reflected.

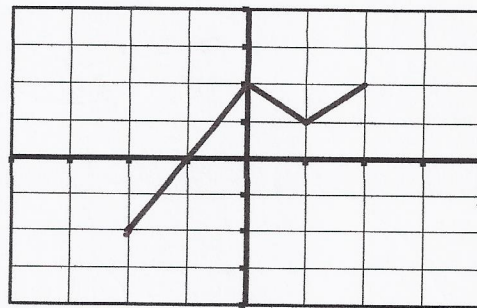
12) (5pts) Write an equation for a square root function that has been flipped over the y-axis, compressed horizontally by 1/2, and shifted up 3.

~~$f(x) = \sqrt{-2x} + 3$~~

~~$f(x) = \left(\frac{-x}{2}\right)^{\frac{1}{2}} + 3 = \left(\frac{-x}{2}\right) + 3$~~

13) (10pts) Based on the graph of $f(x)$ given here

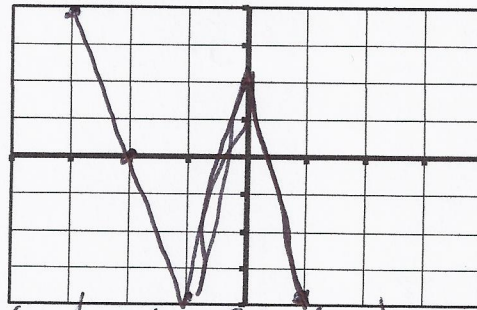
- 2, -2 0, 2 1/2
- 1, 0 1, 1 2, 2
- 0, 2



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

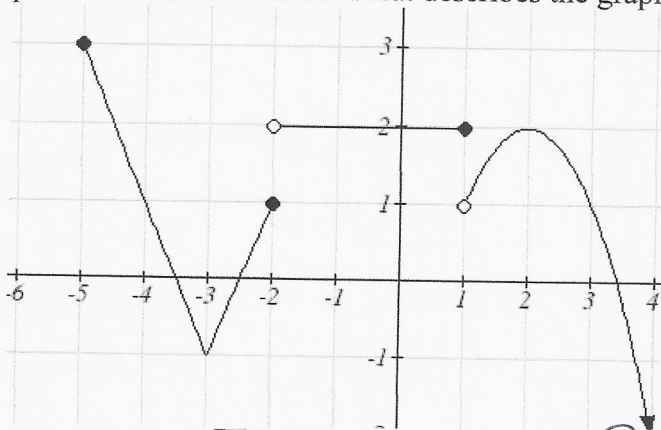
Sketch a graph of $g(x) = -2f(x+1)$ and describe the transformation in words

- 3, 4 -1, -4 0, 2
- 2, 0 0, 2 1, -4
- 1, -4



(inverted on x-axis) / Vertical stretch

14) (13pts) The following graph is made from pieces of three transformed toolkit functions. Write a piecewise defined function that describes the graph.



$f(x) = |x+3| - 1$
 $2x \frac{1}{2} |x+3| - (-3 \leq x \leq -2)$

$$f(x) = \begin{cases} 2|x+3| - 1 & \text{if } \{-5 \leq x \leq -2\} \\ 2 & \text{if } \{-2 < x \leq 1\} \\ -(x-1)^2 + 1 & \text{if } \{x \geq 1\} \end{cases}$$

15) (1pt) What is your instructor's name?

Ms. Shannon Turner

#12 $y = f(x) = \left[\sqrt{-2x} + 3 \right]$