AFM
Unit 1 REVIEW

Name ____________________
Date ____________________

ind the DOMAIN for problems 1 – 4. Write in interval notation.

1. f(x) = $\frac{x}{x^2-9}$ $\neq 0$

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

domain: $(-\infty,-3)\cup(-3,3)\cup(3,\infty)$

2. f(x) = $\sqrt{2-x}$ ≥ 0

$2-x\geq 0$
$-x\geq -2$
$x\leq 2$

domain: $(-\infty, 2]$

3. f(x) = 4x + 3

no restrictions

domain: $(-\infty,\infty)$

4. f(x) = $\frac{\sqrt{x+2}}{x^2+2x-3}$ ≥ 0, $\neq 0$

$x+2\geq 0$ $(x+3)(x-1)\neq$
$x\geq -2$ $\cancel{x\neq -3}$ $x\neq 1$

domain: $[-2,1)\cup(1,\infty)$

5. The graph of a function f is known. Then the graph of y = f(x-2) may be found by moving right 2.

6. The graph of a function is known. Then the graph of y=f(-x) may be obtained by a reflection about the y-axis.

7. True or False:

True a) The graph of y = -f(x) is the reflection about the x-axis of the graph of y = f(x).

False b) To obtain the graph of y = f(x + 2) – 3, shift the graph of y = f(x) horizontally to the right 2 units and vertically down 3 units. left 2, down 3

8. Find the function that is finally graphed after the following transformations are applied to the graph of $y=\sqrt{x}$.

) 1. Shift up 2 units.
2. Reflect about the x-axis.

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

b) 1. Reflect about the x-axis
2. Shift up 2 units.
3. Shift left 3 units.

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

c) 1. Reflect about the y-axis.
2. Vertically stretch by 3.
3. Shift down 2 units.
4. Shift right 4 units. → $3\sqrt{-(x-4)}-2$ simplifies to

f(x) = $3\sqrt{-x+4}-2$

9. USE GRAPH PAPER. State and graph the parent function (dotted line). Then describe the transformation of the parent function and draw the final graph (make sure I clearly see the points and connect using solid line). State the domain and range <u>for the final graph</u>.

a) f(x) = x^3+4

b) f(x) = $(x+4)^2$

c) f(x) = $-\frac{1}{2}|x|$

See graphs on separate sheet

d) f(x) = $-2(x-3)^2$ -1

e) f(x) = $2\sqrt{-x-1}$

→ on separate sheet

10. State the domain in interval notation. Then graph (on graph paper). Then use the graph to state the range.

a) f(x) = $\begin{cases} 3x, & -2<x\leq 1 \\ x+1, & x>1 \end{cases}$

omain: $(-2,\infty)$

range: $(-6,\infty)$

b) f(x) = $\begin{cases} x, & -4\leq x<0 \\ 1, & x=0 \\ 3x, & x>0 \end{cases}$

domain: $[-4,\infty)$

range: $[-4,0)\cup(0,\infty)$

c) f(x) = $\begin{cases} x^2, & -2\leq x\leq 2 \\ 2x-1, & x>2 \end{cases}$

domain: $[-2,\infty)$

range: $[0,\infty)$

11. Find $\dfrac{f(a+h)-f(a)}{h}$, where $h \neq 0$, for the following two functions.

a) f(x) = 2x + 3

$= \dfrac{2(a+h)+3-(2a+3)}{h}$

$= \dfrac{2a+2h+3-2a-3}{h}$

$= \dfrac{2h}{h} = \boxed{2}$

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

$= \dfrac{(a+h)^2-2-(a^2-2)}{h}$

$= \dfrac{a^2+2ah+h^2-2-a^2+2}{h} = \dfrac{2ah+h^2}{h} = \boxed{2a+h}$

12. Evaluate the piecewise function for f(-2), f(1), and f(4). $f(x) = \begin{cases} x^2-2x, \text{ if } x \leq 1 \\ 3x+1, \text{ if } x > 1 \end{cases}$

$f(-2) = (-2)^2 - 2(-2)$
$= 4+4$
$= 8$

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

$f(4) = 3(4)+1$
$= 12+1$
$= \boxed{13}$

13. The domestic postage rate for first class letters weighing 12 oz or less is 33 cents for a letter weighing 1 oz or less and 22 cents for each additional ounce (or part of an ounce). Express the postage P as a function of the weight x of a letter, with 0 < x ≤ 12.

$P(x) = \begin{cases} .33 & 0 < x \leq 1 \\ .33 + .22(x-1) & 1 < x \leq 12 \end{cases}$

14. The cost to attend a play at the theater is $120 for a group of up to ten students. For each student over ten, the cost is $12 for each additional student.

a. Write a piecewise function to show the cost to attend the play. $f(x) = \begin{cases} 120 & 0 < x \leq 10 \\ 120 + 12(x-10) & x > 10 \end{cases}$

b. How much will it cost for 7 students to attend? For 20 students?

$f(7) = \$120$

$f(20) = 120 + 12(20-10)$
$= 120 + 120 = \$240$

15. Using the graph below, identify the domain, range, intervals of increasing, decreasing and/or constant. Then evaluate at the given values.

a) Domain: $(-\infty, \infty)$

b) Range: $[-2] \cup [0, \infty)$

c) Increasing: $(0, \infty)$

d) Decreasing: $(-3, 0)$

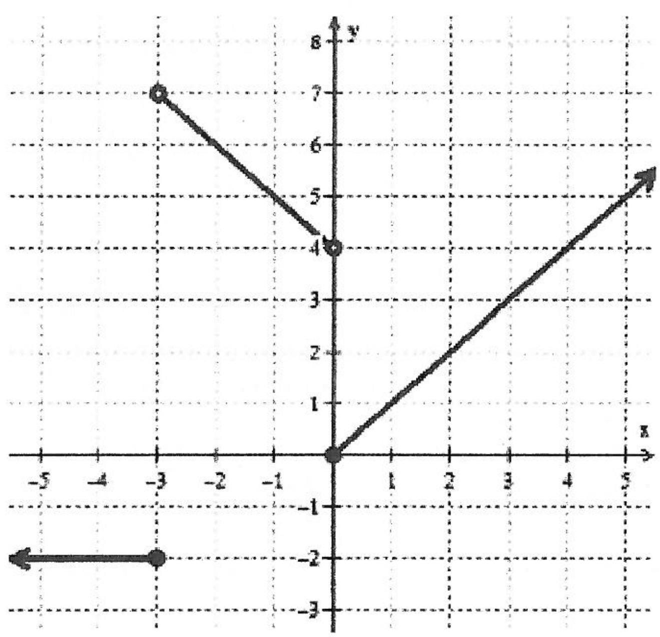
e) Constant: $(-\infty, -3)$

f) f(-4) = -2

g) f(0) = 0

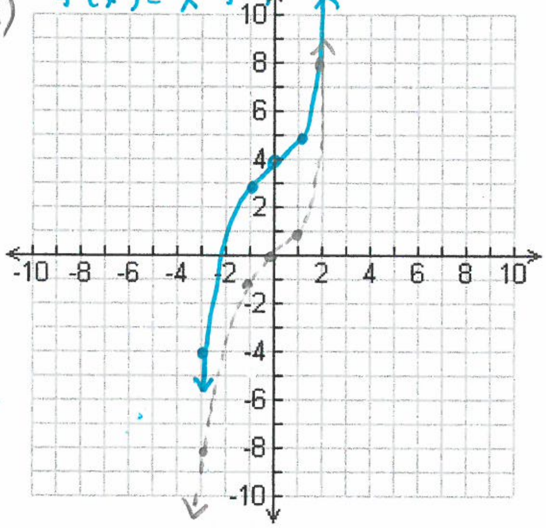
h) f(2) = 2

i) If f(x)= 2, the x = 2



Unit 1 Review – # 9 + 10 Graphs, etc

9 a) $f(x) = x^3 + 4$



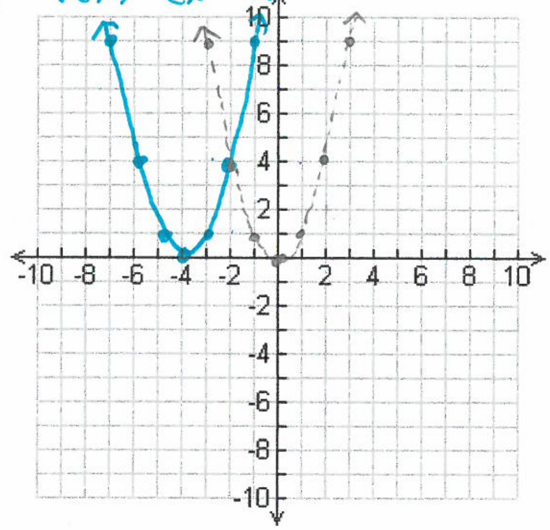
Parent: $f(x) = x^3$

Transformation: up 4

Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

b) $f(x) = (x+4)^2$



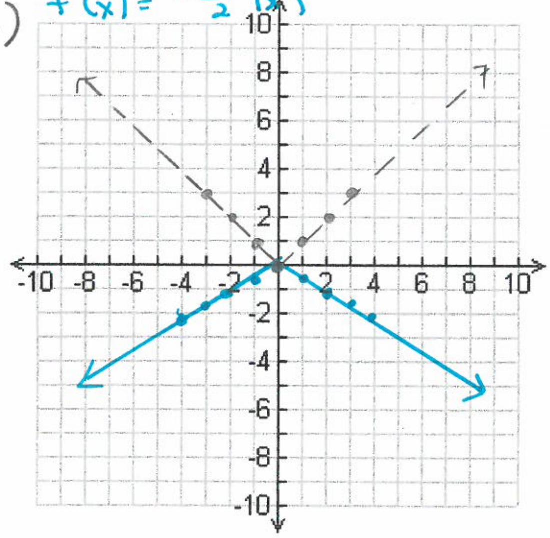
Parent: $f(x) = x^2$

Transformation: left 4

Domain: $(-\infty, \infty)$

Range: $[0, \infty)$

c) $f(x) = -\frac{1}{2}|x|$



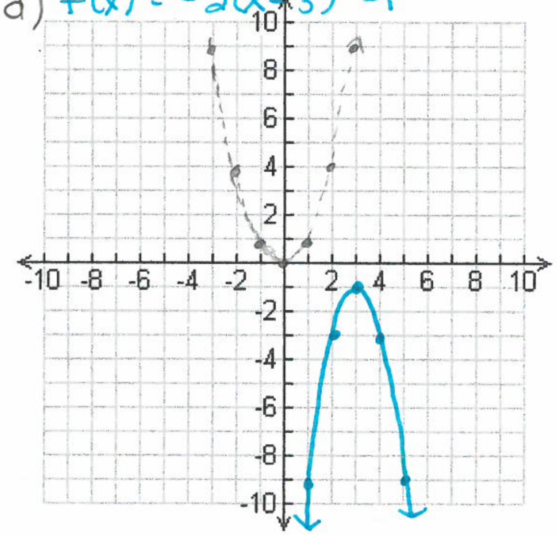
Parent: $f(x) = |x|$

Transformation: reflection across x-axis, vertical shrink of ½.

Domain: $(-\infty, \infty)$

Range: $(-\infty, 0]$

d) $f(x) = -2(x-3)^2 - 1$

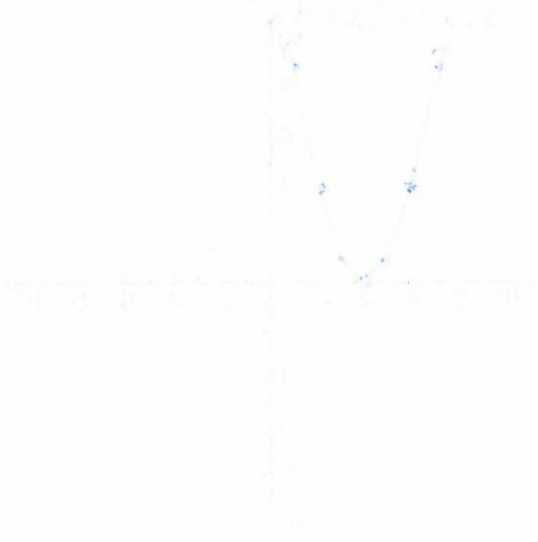


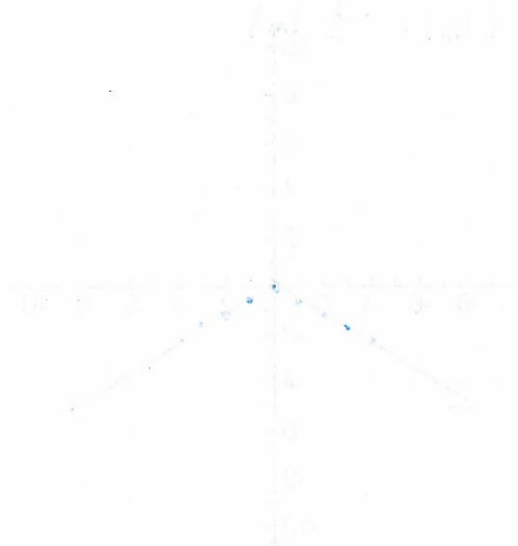
Parent: $f(x) = x^2$

Transformation: Reflection across x-axis, vertical stretch of 2, right 3, down 1

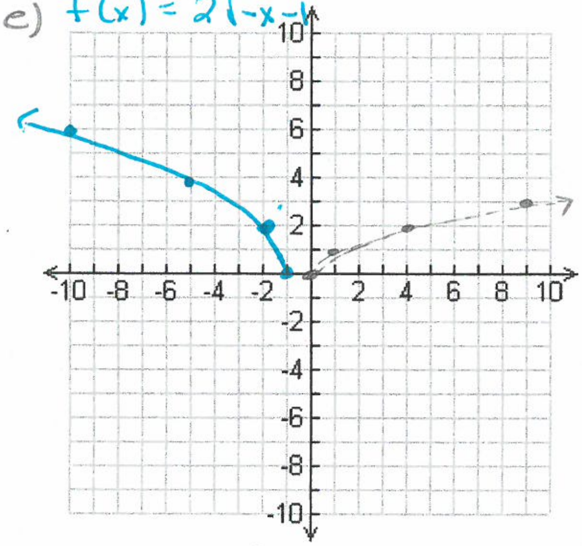
Domain: $(-\infty, \infty)$

Range: $(-\infty, -1]$





9 e) $f(x) = 2\sqrt{-x-1}$



Parent: $f(x) = \sqrt{x}$

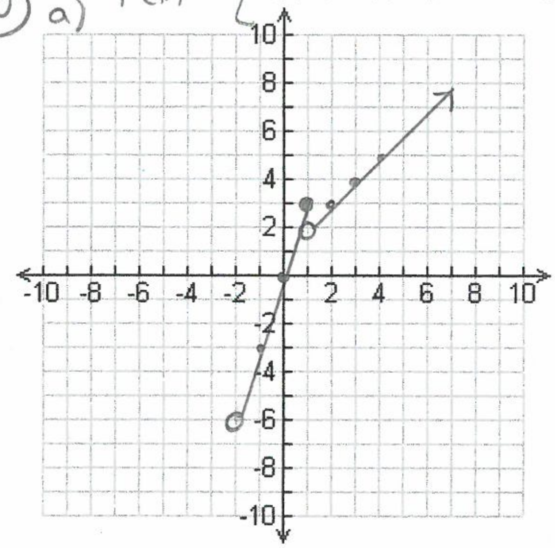
Transformation: vertical stretch of 2, reflection across y-axis, left 1

$f(x) = 2\sqrt{-(x+1)}$

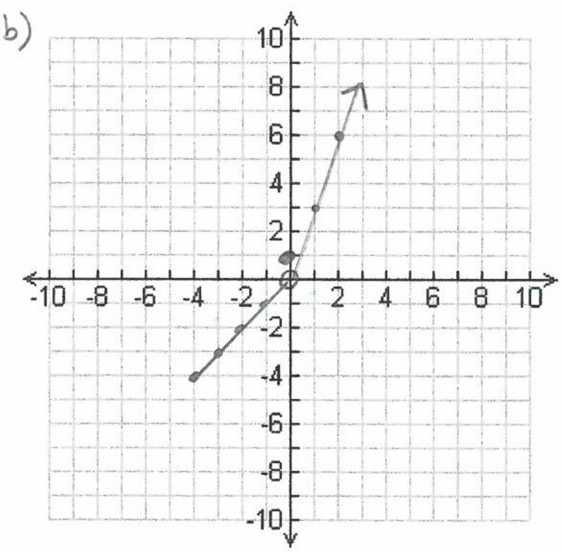
Domain: $(-\infty, -1]$

Range: $[0, \infty)$

10 a) $f(x) = \begin{cases} 3x & -2 < x \le 1 & \bullet\ (1,3) \\ x+1 & x > 1 & \circ\ (1,2) \end{cases}$

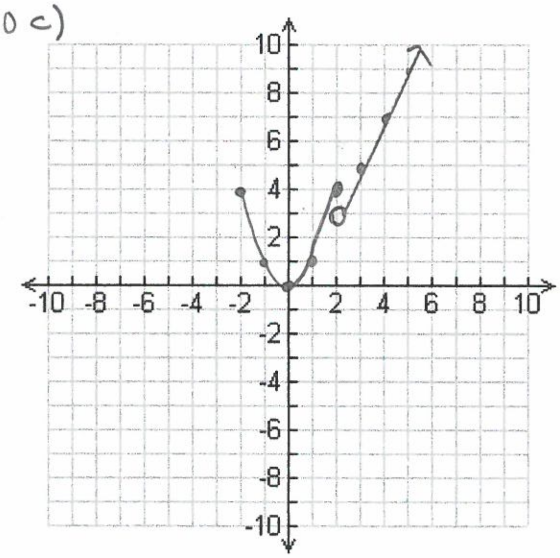


10 b)



$f(x) = \begin{cases} x & -4 \le x < 0 & \circ\ (0,0) \\ 1 & x = 0 & \bullet\ (0,1) \\ 3x & x > 0 & \circ\ (0,0) \end{cases}$

10 c)



$f(x) = \begin{cases} x^2 & -2 \le x \le 2 & \bullet\ (2,4) \\ 2x-1 & x > 2 & \circ\ (2,3) \end{cases}$