

AFM
Unit 1 Test Review

Name Key
Date _____

Find the DOMAIN for problems 1 - 4. Write in interval notation.

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

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

3. $f(x) = 4x + 3$

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

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

domain: $(-\infty, 2]$

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

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 right 2 units.

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:

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

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

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

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

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

c) 1. Reflect about the y-axis.
2. Vertically stretch by 3.
3. Shift down 2 units.
4. Shift right 4 units.

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

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

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

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 for the final graph.

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

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

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

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

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

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

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

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

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

domain: $(-2, \infty)$

domain: $[-4, \infty)$

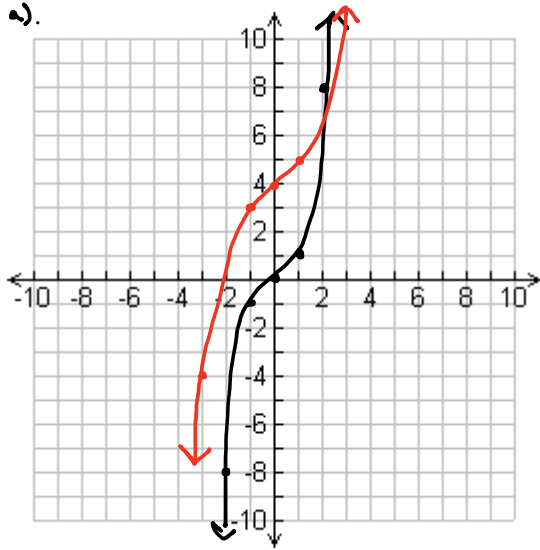
domain: $[-2, \infty)$

range: $(-6, \infty)$

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

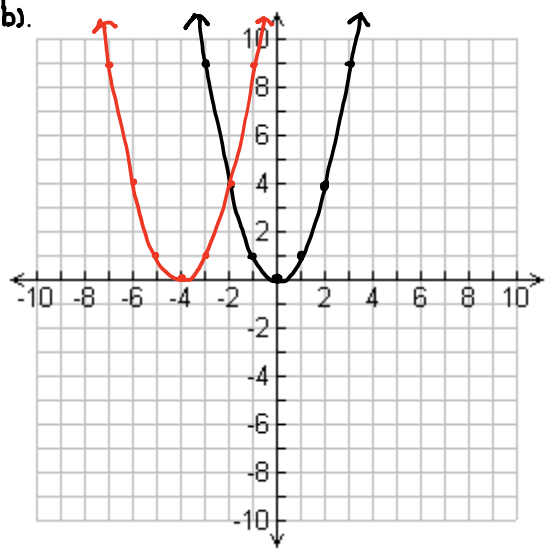
range: $[0, \infty)$

9. a).



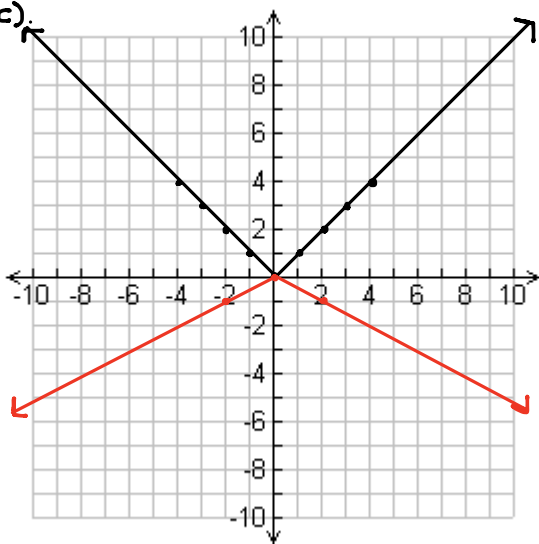
Parent function: x^3
 Transformations: up 4 units
 D: $(-\infty, \infty)$
 R: $(-\infty, \infty)$

b).



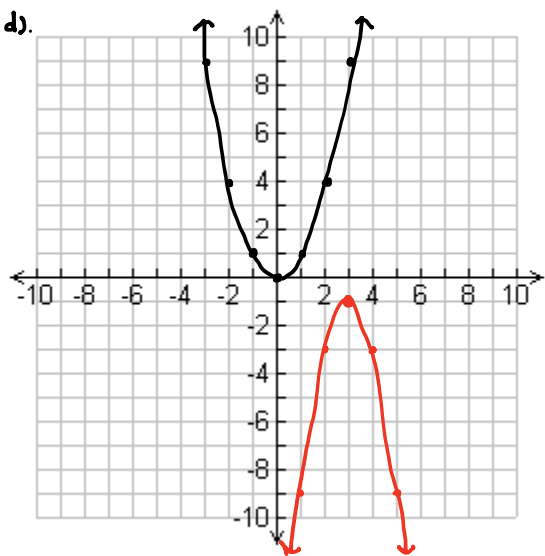
Parent function: x^2
 Transformations: left 4
 D: $(-\infty, \infty)$
 R: $[0, \infty)$

c).



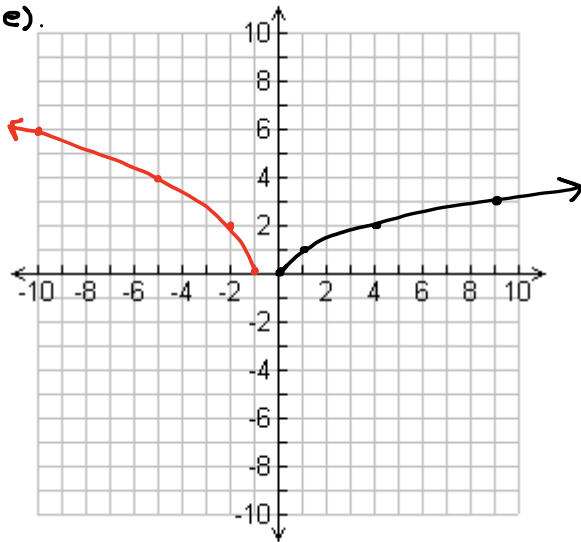
Parent function: $|x|$
 Transformations: reflect over x-axis, vertical shrink
 D: $(-\infty, \infty)$
 R: $(-\infty, 0]$

d).



Parent function: x^2
 Transformations: reflect over x-axis, vertical shrink, right 3, down 1
 D: $(-\infty, \infty)$
 R: $(-\infty, -1]$

9. e).



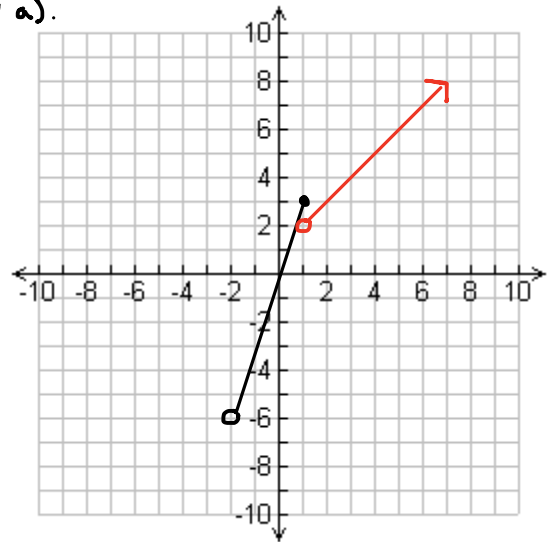
Parent function: \sqrt{x}

Transformations: vertical stretch, reflect

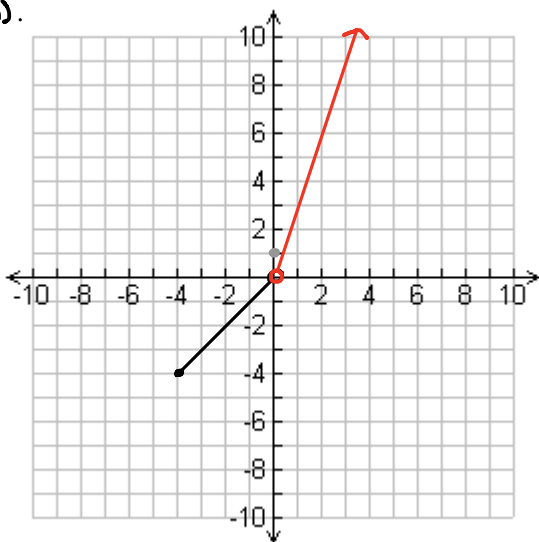
$D: (-\infty, -1]$ over y-axis, left 1

$R: [0, \infty)$

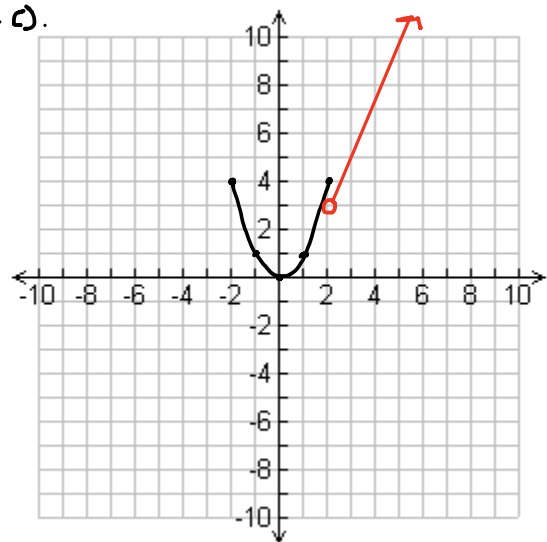
10 a).



10. b).



10. c).



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

a) $f(x) = 2x + 3$

$$\begin{aligned} &= \frac{2(a+h)+3 - (2a+3)}{h} \\ &= \frac{2a+2h+3-2a-3}{h} \\ &= \frac{2h}{h} = 2 \end{aligned}$$

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

$$\begin{aligned} &= \frac{(a+h)^2 - 2 - (a^2 - 2)}{h} \\ &= \frac{a^2 + 2ah + h^2 - 2 - a^2 + 2}{h} \\ &= \frac{2ah + h^2}{h} = 2a + h \end{aligned}$$

12. Evaluate the piecewise function for $f(-2)$, $f(1)$, and $f(4)$.
 $\qquad\qquad\qquad = 8 \quad = -1 \quad = 13$

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

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 $0 < x \leq 12$.

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

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?

$$f(7) = \$120 \qquad f(20) = \$240$$

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: $(-3, \infty)$

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

f) $f(-4) = -2$

g) $f(0) = 0$

h) $f(2) = 2$

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

