C_03 Key to More Chapter 1 Practice

Friday, January 13, 2017 3:02 PM

PREC 12 – Reviewing 1.0-1.2 **Name:** Key

1. Describe how the graph of the second function compares to the graph of the first function:

a) $y = x^5$
$y = x^5 - 4$

Down 4

b) $y = 8x + 2$
$y = 8(x-5) + 2$

Right 5
(not up 2, the "+2" was there in the original)

c) $y = |x|$
$y = |x-5| + 3$

Right 5, up 3

2. Write the new equation obtained after:

a) $y = x^2$ is translated 6 units to the left $y = (x+6)^2$

b) $y = 5^x$ is translated 3 units right $y = 5^{x-3}$

c) $y = \log(x)$ is translated 6 units left and 2 units up

$y = \log(x+6) + 2$

3. The function $y = f(x)$ is transformed to become $y - 5 = f(x+4)$. If the point $(-2, 6)$ lies on the graph of $y = f(x)$ what is its ***image point*** on the graph of $y - 5 = f(x+4)$?

Go up 5, left 4: $\boxed{(-6, 11)}$

4. What is the domain for each of the following functions?

a) $y = \dfrac{5}{3x+1}$

$3x+1 \neq 0$
$3x \neq -1$
$\boxed{x \neq -\frac{1}{3}}$

b) $y = \sqrt{2x-8}$

$2x - 8 \geq 0$
$2x \geq 8$
$\boxed{x \geq 4}$

5. $y = f(x)$ contains the point $(12, 24)$. It is changed as follows. What is the image point in each case?

a) $y = f(-x)$ $(-12, 24)$

b) $y = -f(x)$ $(12, -24)$

c) $x = f(y)$ $(24, 12)$

d) $y = f(8x)$ $(3/2, 24)$

e) $y = f\left(\frac{1}{2}x\right)$ $(24, 24)$

f) $y = \frac{1}{2}f(x)$ $(12, 12)$

g) $y = 6f(x)$ $(12, 144)$

h) $2y = f(4x)$ $(3, 12)$

VS $\frac{1}{2}$ HS $1/4$

6. For each part below, describe how the graph of the second function compares to the graph of the first function:

a) $y = x^5$

$y = 3x^5$ VS by 3

or $y = 3(x^5)$

b) $y = x^2$

$y = (4x)^2$ HS by $\frac{1}{4}$

c) $y = |x|$

$y = \left|\frac{1}{2}x\right|$ HS 2

d) $y = \frac{1}{x}$

$4y = \frac{1}{x}$ VS $\frac{1}{4}$

7. The function $y = f(x)$ is transformed to $3y = f(x)$. If the point (–12, 12) lies on the graph of $y = f(x)$, what is its ***image point*** on the graph of $3y = f(x)$?

VS $\frac{1}{3}$ (-12, 4)

8. The function $y = f(x)$ is transformed to $y = f\left(-\frac{1}{2}x\right)$. If the point (–2, 4) lies on the graph of $y = f(x)$, what is its ***image point*** on the graph of $y = f\left(-\frac{1}{2}x\right)$?

$(-2,4) \xrightarrow{\text{reflect across y}} (2,4)$ HS by 2 $\boxed{(4,4)}$

HS by -2

(OR: HS by 2, reflect across y-axis)

OR: $(-2,4) \xrightarrow{\text{HS by -2}} (4,4)$

9a) List each change that will happen in the graph, when the equation $y = f(x)$ is changed to $y = 2f\left(-\frac{1}{2}x\right)$.

VS by 2
HS by -2

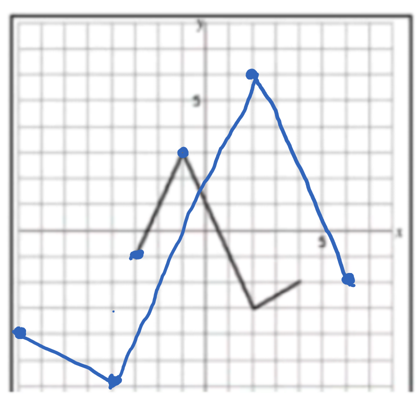
b) The graph of $y = f(x)$ is shown on the grid. Sketch the graph of $y = 2f\left(-\frac{1}{2}x\right)$ on the same grid.

ORIG

x	y
-3	-1
-1	3
2	-3
4	-2

new

x	y
6	-2
2	6
-4	-6
-8	-4



REVIEW OF 1.3-1.4, AND DOMAIN/RANGE

1. Suppose that the graph of $y = f(x)$ contains the point (24, 4). Find the ***image point*** under each of the following transformations:

a) $y = -2f(3(x+2))+7$

reflect x-axis
VS by 2
HS $\frac{1}{3}$
left 2
up 7

$(24,4) \rightarrow (24,-4) \rightarrow (24,-8) \rightarrow (8,-8) \rightarrow \boxed{(6,-1)}$

b) $y = f(8x-16)+2$

$y = f(8(x-2))+2$

HS $\frac{1}{8}$
right 2
up 2

$(24,4) \rightarrow (3,4) \rightarrow (5,4) \rightarrow \boxed{(5,6)}$

2. A function, $y = g(x)$, has domain $\{x \mid 5 \le x \le 9,\ x \in \mathbb{R}\}$ and range $\{y \mid -4 \le y \le 12,\ y \in \mathbb{R}\}$.

a) What is the domain of the inverse of g(x)?

$\{x \mid -4 \le x \le 12,\ x \in \mathbb{R}\}$

b) What is the range of the inverse of g(x)?

$\{y \mid 5 \le y \le 9,\ y \in \mathbb{R}\}$

3. State the domain for each of the following. Remember that division by zero is undefined and that we cannot take square roots of negative numbers – this should help you figure out the domains.

a) $f(x) = \frac{5}{x-3}$

$x-3 \neq 0$
$x \neq 3$

$\{x \mid x \neq 3,\ x \in \mathbb{R}\}$

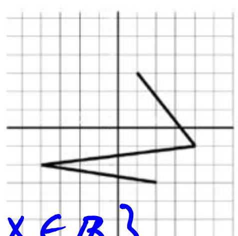
b) $f(x) = \sqrt{18-2x}$

$18-2x \geq 0$
$\frac{18}{2} \geq \frac{2x}{2}$
$9 \geq x$

$\{x \mid x \le 9,\ x \in \mathbb{R}\}$

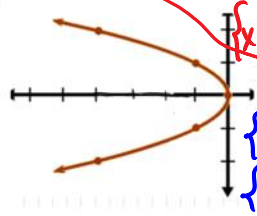
4. State the domain and range for each of the following:

a)



$\{x \mid -4 \le x \le 4,\ x \in \mathbb{R}\}$
$\{y \mid -3 \le y \le 3,\ y \in \mathbb{R}\}$

b)



$\{x \mid x \le 0,\ x \in \mathbb{R}\}$
$\{y \mid y \in \mathbb{R}\}$

5. What is the equation of the inverse of $f(x) = 3x+12$?

1) replace f(x) with y: $y = 3x+12$

2) trade x and y: $x = 3y+12$

3) solve for y.

$x = 3y+12$

$\frac{x-12}{3} = \frac{3y}{3}$

$y = \frac{x-12}{3}$

$f^{-1}(x) = \frac{x-12}{3}$

1a) (6, -1) b) (5, 6)
2a) $\{x \mid -4 \le x \le 12,\ x \in \mathbb{R}\}$ b) $\{y \mid 5 \le y \le 9,\ y \in \mathbb{R}\}$
3a) $\{x \mid x \neq 3,\ x \in \mathbb{R}\}$ b) $\{x \mid x \le 9,\ x \in \mathbb{R}\}$
4a) $\{x \mid -4 \le x \le 4,\ x \in \mathbb{R}\}$ $\{y \mid -3 \le y \le 3,\ y \in \mathbb{R}\}$
b) $\{x \mid x \le 0,\ x \in \mathbb{R}\}$ $\{y \mid y \in \mathbb{R}\}$

5. $y = \frac{x-12}{3}$, or $f^{-1}(x) = \frac{x-12}{3}$

PREC12 Chapter 1 Practice Test **Name:** Answer Key

1. If y is replaced by $y+3$ in a function, then the graph of the new function will be:

A. translated up 3 B. translated down 3

C. vertically stretched, factor 3 D. vertically stretched, factor $\frac{1}{3}$

2. The point (3, 5) is on the graph of the function $y = f(x)$. The point (0, 6) is on the graph of the function $y = f(x-a)+b$. What are the values of a and b ?

A. $a = 3,\ b = 1$ B. $a = 3,\ b = -1$

C. $a = -3,\ b = 1$ D. $a = -3,\ b = -1$

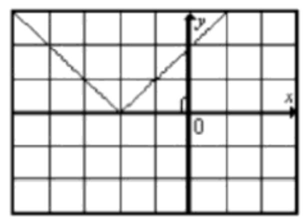
Point has moved 3 left and 1 up, so we have y = f(x + 3) + 1 which means the same thing as y = f(x - (-3)) + 1

3. Which equation will move the graph of $y = x^2$ three units to the left?

A. $y-3 = x^2$ B. $y = x^2 - 3$

C. $y = (x-3)^2$ D. $y = (x+3)^2$

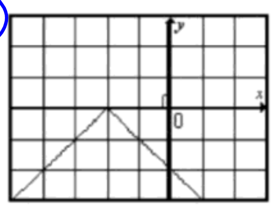
4. The graph of $y = g(x)$ is given at right.



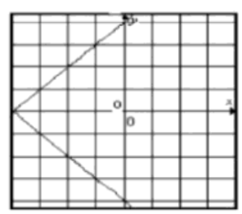
A graph of $y = -g(x)$ would appear as which graph below?

reflect across the y-axis
(upside-down)

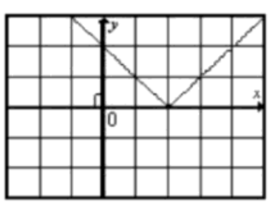
a)



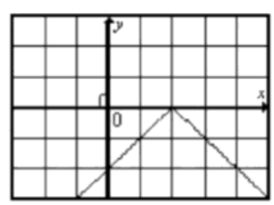
b)



c)



d)



5. In which line is $y = 2x^2 - 3x$ reflected to obtain $x = 2y^2 - 3y$?

A. $y = x$ B. x-axis

C. y-axis D. both x-axis and y-axis

x's and y's have interchanged,
so reflects across y = x

This reflects across the y-axis, so the "mirror" is the y-axis.

6. If $y = f(x)$ is transformed to $\overbrace{y = f(-x)}$, any ***invariant points*** will lie on:

A. the x-axis
B. the y-axis
C. the line $y = x$
D. there are no invariant points

7. The point $(7,-4)$ is on the graph of the function $y = f(x)$. Which point must be on the graph of the function $y = -2f(x)$? VS by 2 and reflect across x-axis => multiply y-coordinate by -2.

A. $(7,-8)$
B. $(7,8)$
C. $(7,-2)$
D. $(7,2)$

8. What value of a in the equation $y = \sqrt{ax}$ will cause a horizontal stretch, factor $\frac{1}{3}$?

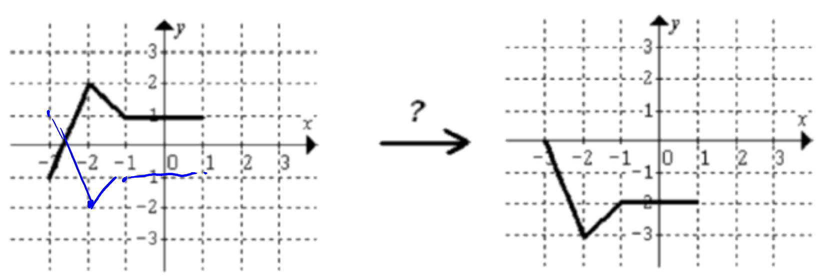
A. $a = \frac{1}{3}$
B. $a = 3$
C. $a = -\frac{1}{3}$
D. $a = -3$

9. If $y = f(x)$ is compared to $y = f(3x-6)$, what transformations have occurred?

A. horizontal stretch factor $\frac{1}{3}$, right 6 units
B. horizontal stretch factor $\frac{1}{3}$, right 2 units
C. horizontal stretch factor 3, right 2 units
D. horizontal stretch factor 3, right 6 units

Factor first:
$y = f(3(x-2))$
=> HS by 1/3, 2 units right

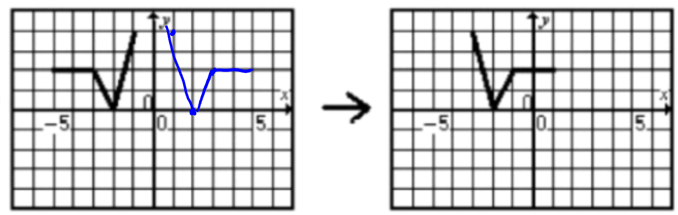
10. The graph of $y = f(x)$ is given below. What transformations will produce the new image?



A. reflect in the x-axis and shift down one
B. reflect in the x-axis and shift up one
C. reflect in the y-axis and shift down one
D. reflect in the y-axis and shift up one

it's upside-down, so reflect across x-axis then shift down 1 unit

11. The graph of $y = h(x)$ is shown below. What new equation will produce the graph of the transformed function?

$y = h(x)$ 

reflect in the y-axis
then
shift 4 units
left

A. $-y = h(x+4)$

B. $y = h(-x)$

C. $y = h(-(x+4))$

D. $y = h(-(x-4))$

12. The point (a, b) is on the graph of $y = f(x)$. Which point must be on the graph of $y + 2 = 3f(-x)$?

$y = 3f(-x) - 2$ down 2

VS 3

reflect across y-axis

A. $(-a,\ 3b-2)$

B. $(-a,\ 3(b-2))$

C. $\left(-a,\ \frac{b-2}{3}\right)$

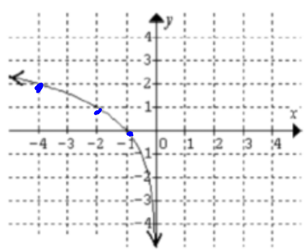
D. $\left(-a,\ \frac{b}{3}-2\right)$

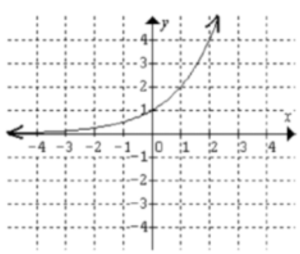
13. Identify the graph of the ***inverse*** for the function shown at right.

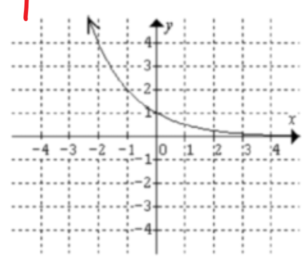
trade x and y coordinates

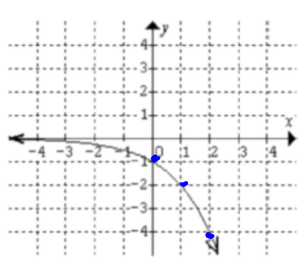
ORIG	
-4	2
-2	1
-1	0

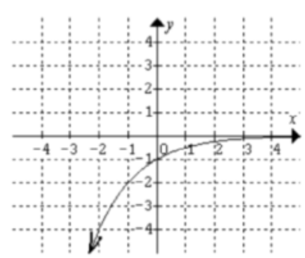
inverse	
2	-4
1	-2
0	-1



a)


b)


c)


d)


$y = x^3 + 4$

$y = x^3 + 4$

1) trade x and y: $x = y^3 + 4$

2) solve for y: $x - 4 = y^3$

$\sqrt[3]{x-4} = \sqrt[3]{y^3}$

$\sqrt[3]{x-4} = y$

inverse

14. Find $y = f^{-1}(x)$ if $f(x) = x^3 + 4$.

A. $f^{-1}(x) = x^3 - 4$

B. $f^{-1}(x) = \dfrac{1}{x^3 + 4}$

C. $f^{-1}(x) = \sqrt[3]{x} - 4$

D. $f^{-1}(x) = \sqrt[3]{x - 4}$

15. Kalvin is asked what steps would be required to graph $y = f(2x+6)$ if he is given the graph of $y = f(x)$. He writes that the function needs to be vertically stretched by a factor of $\frac{1}{2}$ and then translated right 6 units. What mistakes did he make?

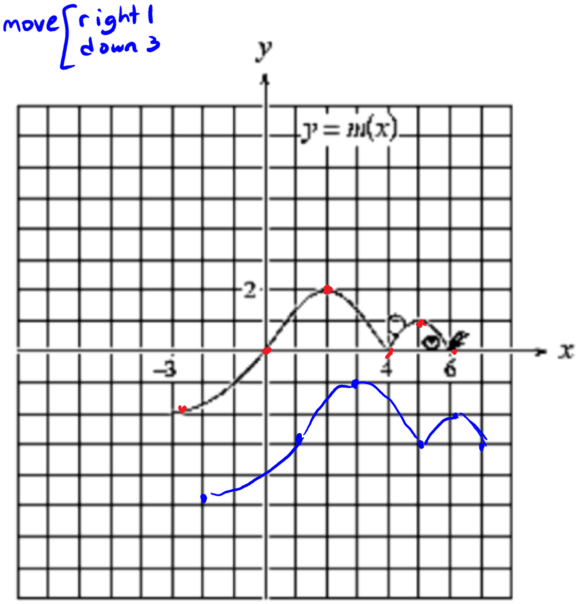
1) First, he should factor, to get $y = f(2(x+3))$

2) He should say horizontal stretch by $\frac{1}{2}$, and a translation LEFT, 3 units.

16. Omitted

17. Given the graph of $y = m(x)$ below, draw the graph of $y + 3 = m(x-1)$.

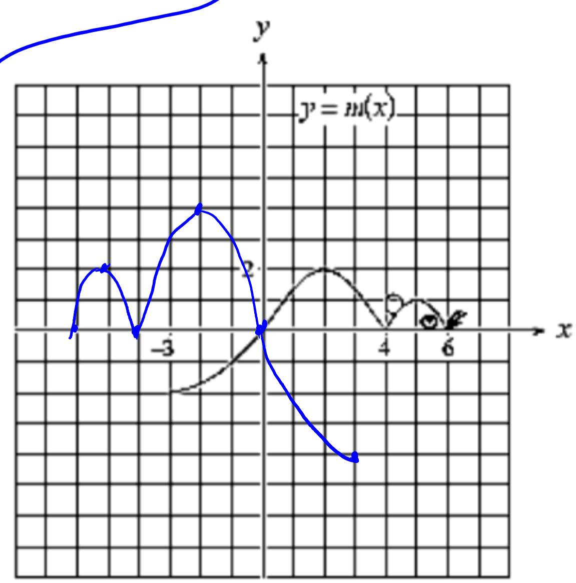
move right 1, down 3



ORIG	
-3	-2
0	0
2	2
4	0
5	1
6	0

new	
3	-4
0	0
-2	4
-4	0
-5	2
-6	0

18. Given the graph of $y = m(x)$ below, draw the graph of $\frac{1}{2}y = m(-x)$.



$\frac{1}{2}y = m(-x)$ means the same as

$\frac{2}{1}\left(\frac{1}{2}y\right) = \frac{2}{1}m(-x)$

$y = 2m(-x)$

19. Given the graph of $y = m(x)$ at right, draw the graph of $y = m(-x+2)$.

Factor first: $y = m(-x+2)$

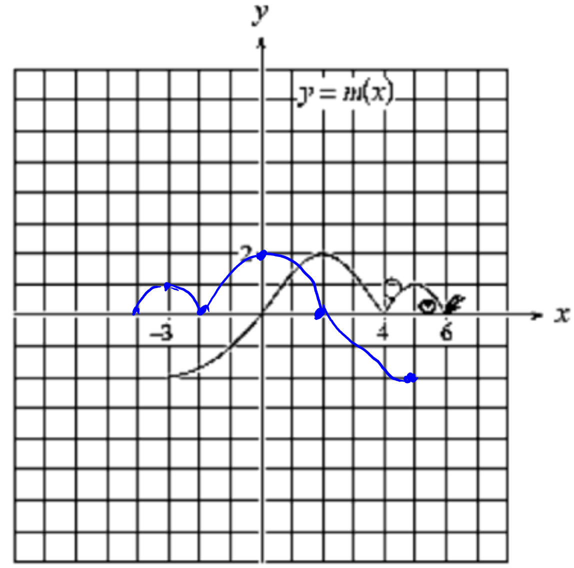
$y = m(-1(x-2))$

$\Rightarrow$ reflect across y-axis

translate 2 right

final pts

5	-2
2	0
0	2
-2	0
-3	1
-4	0



20. Given the function $y = (x-3)^2 - 2$

a) Graph the function on the grid.

parabola, $V = (3, -2)$

b) Determine the domain of this function.

$\{x \mid x \in \mathbb{R}\}$

c) Determine the range of this function.

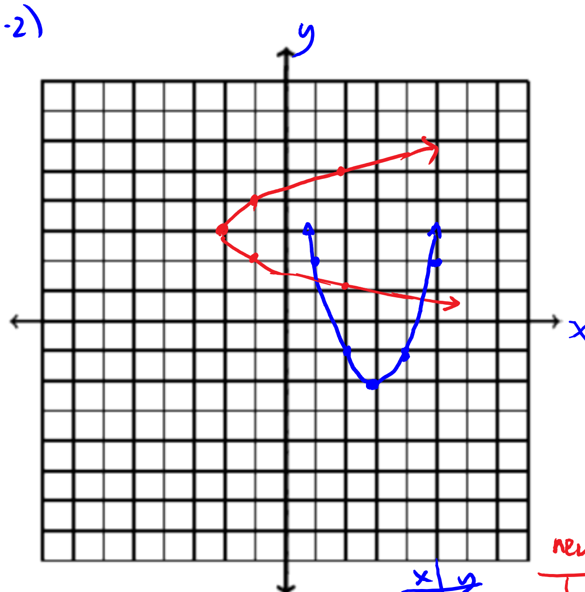
$\{y \mid y \geq -2,\ y \in \mathbb{R}\}$

d) Graph the ***inverse*** of this function.

Trade x and y. (red graph)

e) How could you restrict the domain of $y = (x-3)^2 - 2$ so that its inverse will also be a function?

Restrict domain to either $x \geq 3$, the right half of the parabola
OR, to $x \leq 3$, the left half of the parabola



x	y
3	-2
4	-1
2	-1
5	2
1	2

new

-2	3
-1	4
-1	2
2	5
2	1

f) Algebraically, determine the equation of the inverse of $y = (x-3)^2 - 2$.

1) Trade x and y: $y = (x-3)^2 - 2$ becomes $x = (y-3)^2 - 2$

2) Solve for y.

$$x + 2 = (y-3)^2$$

$$\pm\sqrt{x+2} = \sqrt{(y-3)^2}$$

$$\pm\sqrt{x+2} = y - 3$$

$$y = 3 \pm \sqrt{x+2}$$

To be a function, pick either

$y = 3 + \sqrt{x+2}$ (top half)

To be a function, pick either

$y = 3 + \sqrt{x+2}$ (top half)

OR

$y = 3 - \sqrt{x+2}$ (bottom half)