College Algebra FOCUS **Name:**

Practice Test 1B **Spring 2012**

1. **A.** Fill in the blanks. [**Domain**, **Range**, **Relation**, **Function**]

A function f from a set A to a set B is a relation that assigns

to each element x in the set A exactly one element y in the set B.

B. Fill in the blanks. [**Domain**, **Range**, **Relation**, **Function**]

When discussing a function f, the first set is called the domain and the

second set is called the range.

C. State the definition of a function.

A function f from a set A to a

set B is a relation that assigns

to each element in set A exactly one

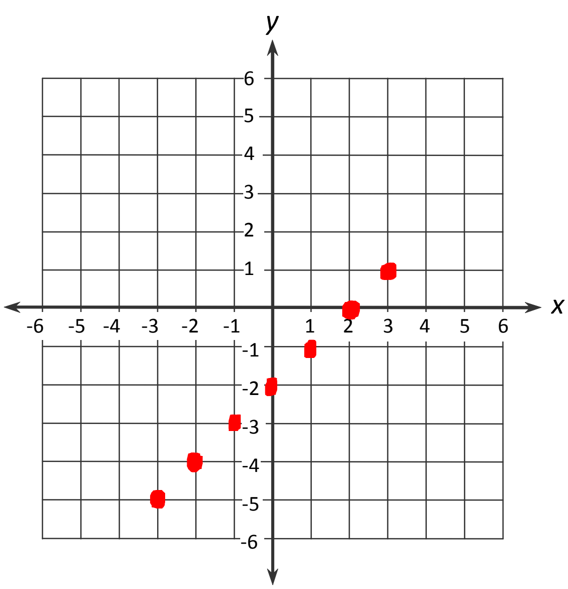
element in set B.

2. State an example of a function...

A. in table form. $y = x - 2$

x	y
-3	-5
-2	-4
-1	-3
0	-2
1	-1
2	0
3	1

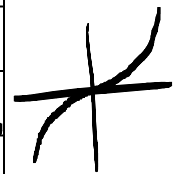
B. in graph form.

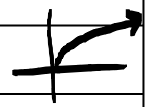


(-3, -5)
(-2, -4)
(-1, -3)
(0, -2)
(1, -1)
(2, 0)
(3, 1)

3. Choose one common function from the list below and answer the questions that follow:

✓	Algebraic Form	Name
	$f(x) = k$ ✓	Constant Function (linear)
	$f(x) = x$ ✓	Identity Function (linear)
✓	$f(x) = x^2$ ✓	Square Function (parabola, U)
	$f(x) = x^3$ ✓	Cubic Function
	$f(x) = \sqrt{x}$ ✓	Square Root Function
	$f(x) = \lvert x \rvert$ ✓	Absolute Value Function (V)
	$f(x) = \dfrac{1}{x}$ ✓	Reciprocal Function (hyperbola)
	$f(x) = [\![x]\!]$	Greatest Integer Function (step)





State the following and provide **JUSTIFICATION** for each.

A. Domain in set-builder notation

$\{x^2 \mid -\infty < x < \infty\}$

D. Range, in words

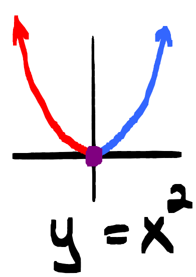
$f(x)$

all real numbers greater than or equal to zero.

E. Intervals where the function is

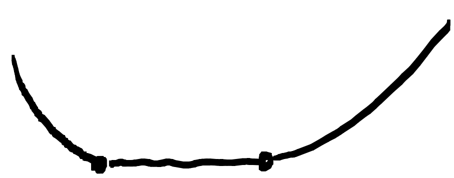
a. Increasing

$(0, \infty)$



b. Decreasing

$(-\infty, 0)$



c. Constant

Nowhere

F. Whether or not the function is symmetric with respect to the

a. x-axis. (Hint: replace y with $-y$.)

No

$$y = x^2$$
$$-y = x^2$$
$$y = -x^2$$

b. y-axis. (Hint: replace x with $-x$.)

Yes

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

b. origin. (Hint: replace y with $-y$ and x with $-x$.)

No

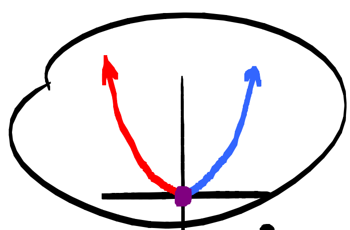
$$y = x^2$$
$$-y = (-x)^2$$
$$-y = x^2 \rightarrow y = -x^2$$

G. Whether or not the function is

a. Even

yes

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

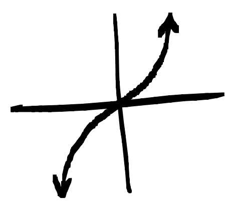


$f(x) = x^2$

b. Odd

No

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



c. Neither

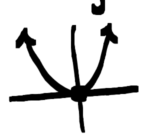
No

H. Whether the function has

a. x-intercepts

$y = 0$ $\quad y = x^2$

$$0 = x^2$$
$$x = 0$$



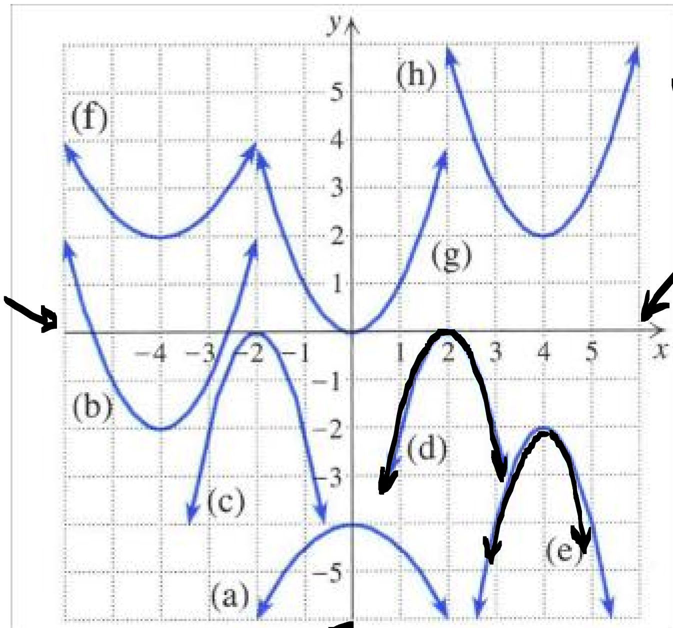
b. y-intercepts

$x = 0$

$$y = x^2$$
$$y = 0^2$$
$$y = 0$$

4.

Xmin = -6



ymax = 6

Xmax = 6

ymin = -6

A. Match each function with its graph.

i. $y = x^2$ g

ii. $y = (x - 4)^2 + 2$ h

iii. $y = -2(x - 4)^2 - 2$ e

iv. $y = \frac{1}{2}(x + 4)^2 + 2$ f

v. $y = -2(x - 2)^2$ d

B. Write the equation of the graph after the indicated transformation.

a. The graph of $y = |x|$ is translated three units right. y = abs(x)

y = | x - 3 |

b. The graph of $y = x$ is translated 2 units to the left and 5 units up.

y = (x+2) → $\boxed{y = (x+2) + 5}$ → y = x + 7

c. The graph of $y = x^2$ is translated 4 unit to the right, 2 units down and reflected about the x-axis.

y = x² → y = (x-4)² → y = (x-4)² - 2 → $\boxed{y = -(x-4)^2 + 2}$

5. If $f(x) = 2\sqrt{x} + 3$ and $g(x) = x^2 + 4$, find the following.

Simplify if possible and state the domain where requested.

A. $(f+g)(1)$ $= f(1) + g(1)$

$f(1) = 2\sqrt{1} + 3 = 2 \cdot 1 + 3 = 5$

$g(1) = (1)^2 + 4 = 1 + 4 = 5$

$(f+g)(1) = f(1) + g(1) = 5 + 5 = \boxed{10}$

B. $(f-g)(x)$ $= f(x) - g(x)$

$(2\sqrt{x} + 3) - (x^2 + 4) \rightarrow 2\sqrt{x} + \underline{\underline{3}} - x^2 - \underline{\underline{4}}$

$2\sqrt{x} - x^2 - 1$ ✓

Domain in set-builder notation: $\{x \mid x \geq 0\}$

$f(x) = 2\sqrt{x} + 3 \quad g(x) = x^2 + 4$

C. $(f \cdot g)(0)$ $= f(0) \cdot g(0)$

$f(0) = 2\sqrt{0} + 3 = 2 \cdot 0 + 3 = 0 + 3 = 3$ ✓

$g(0) = 0^2 + 4 = 0 + 4 = 4$

$f(0) \cdot g(0) = 3 \cdot 4 = \boxed{12}$

D. $\left(\frac{f}{g}\right)(0)$ $= \frac{f(0)}{g(0)} = \frac{3}{4}$

$\boxed{\frac{3}{4}}$

E. $(f \circ g)(1)$

$(f \circ g)(x) = f(g(x))$

$f(g(1))$

$f(5) = \boxed{2\sqrt{5} + 3}$

$f(x) = 2\sqrt{x} + 3 \quad g(x) = x^2 + 4$

$f(\cancel{x}) = 2\sqrt{\cancel{x}} + 3 \quad g(1) = 1^2 + 4$

$f(g(x)) = 2\sqrt{g(x)} + 3 \quad 1 + 4$

$f(x^2 + 4) = 2\sqrt{x^2 + 4} + 3 \quad 5$

6. True of False. $\{0, 1, 2, 3, \ldots\}$ Write **TRUE** or **FALSE**.

A. -2 is an element of the set of **Whole Numbers**. FALSE

B. The **domain** of $y = |x|$ is $(-\infty, \infty)$. TRUE

C. The **range** of $y = |x|$ is $[0, \infty)$. TRUE

$|-x| + 3 = |x| + 3$

D. If $f(x) = |x| + 3$, then $f(-x) = f(x)$. TRUE

E. If $f(x) = |x| + 3$, then $f(-x) = -f(x)$. FALSE

$-(|x| + 3)$

F. If $x = \frac{1}{2}t$ and $F = x^2$, then F is a function of t. TRUE

$F = x^2 \rightarrow \left(\frac{1}{2}t\right)^2 = \frac{1}{4}(t)^2$

G. Another way to write "all real numbers" is $(-\infty, \infty)$. TRUE

7. **A.** Describe the following sets of numbers: [page 80]

a. Natural Numbers: $\{1, 2, 3, \ldots\}$

b. Whole Numbers: $\{0, 1, 2, 3, \ldots\}$

$\sqrt{1}$ **c.** Integers: $\{\ldots, -3, -2, -1, 0, 1, 2, 3, \ldots\}$

d. Rational Numbers: $\left\{ \frac{p}{q} \mid p \text{ and } q \text{ are integers}, q \neq 0 \right\}$

$\sqrt{2}$ **e.** Irrational Numbers:

$\sqrt{3}$ π all real numbers that cannot written as $\frac{p}{q}$

B. Name all the subsets of the real numbers for which 5 belongs.

Natural, Whole, Integers, Rational, Real

C. Name all subsets of the real numbers for which $\frac{4}{5}$ belongs.

Rationals, Reals

8. Match the example to the correct field property

i. $a + 0 = a$

ii. $a(b + c) = ab + ac$

iii. $(a + b) + c = (b + a) + c$

iv. $a + (-a) = 0$

v. $(a + b) + c = a + (b + c)$

A. Distributive Property ii

B. Associative Property of Addition v

C. Commutative Property of Addition iii

D. Identity Property of Addition i

E. Inverse Property of Addition iv

$-3 + 3 = 0$

9. **A.** Write the slope-intercept form of the line $4x - 2y = 3$.

$y = mx + b$

$$4x - 2y = 3$$
$$-4x \qquad -4x$$

slope

y-int.

$$\frac{-2y}{-2} = \frac{-4x}{-2} + \frac{3}{-2} \rightarrow y = 2x - \frac{3}{2}$$

B. Write the slope-intercept form of the equation of ~~the line~~ that is **parallel** to $4x - 2y = 3$ and passes through the point $(2, 1)$.

$$y = mx + b$$
$$y = 2x + b$$
$$(2,1) \rightarrow x = 2,\ y = 1$$
$$\rightarrow 1 = 2 \cdot 2 + b$$
$$1 = 4 + b \rightarrow -3 = b$$
$$-4 \quad -4$$

$$y = 2x + b$$
$$\boxed{y = 2x - 3}$$

C. Write the slope-intercept form of the equation of the line ~~that is~~ **perpendicular** to $4x - 2y = 3$ and passes through the point $(2, 1)$.

$$y = 2x - \frac{3}{2}$$

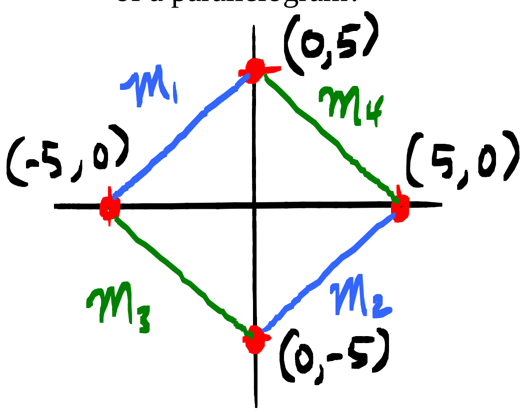
$$m_1 = 2$$
$$m_2 = -\frac{1}{2}$$

$$y = -\frac{1}{2}x + b$$
$$1 = -\frac{1}{\cancel{2}}(\cancel{2}) + b$$
$$1 = -\cancel{1} + b$$
$$+1 \quad \cancel{+1}$$
$$2 = b$$

$$y = -\frac{1}{2}x + b$$
$$\boxed{y = -\frac{1}{2}x + 2}$$

D. Are the points $(-5, 0)$, $(0, 5)$, $(5, 0)$ and $(0, -5)$ ~~verticies~~ vertices of a parallelogram?

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$



$$m_1 = \frac{5-0}{0--5} = \frac{5}{5} = 1$$
$$m_2 = \frac{0--5}{5-0} = \frac{5}{5} = 1$$
$$m_3 = \frac{-5-0}{0--5} = \frac{-5}{5} = -1$$
$$m_4 = \frac{0-5}{5-0} = \frac{-5}{5} = -1$$

yes!

10. **A.** Find the slope of the line through the points $(5, -1)$ and $(-5, 5)$.

$x_1 \quad y_1 \qquad x_2 \quad y_2$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{5 - -1}{-5 - 5}$$

$$= \frac{5+1}{-10} = \frac{6}{-10} = \boxed{\frac{3}{-5}}$$

B. Write the slope-intercept form of the equation of the line passing through the points in part **A** above.

$x \quad y$

$(5, -1)$

$$y = mx + b$$

$$y = -\frac{3}{5}x + b$$

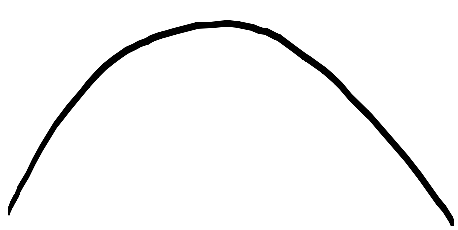
$$-1 = -\frac{3}{\cancel{5}}(\cancel{5}) + b$$

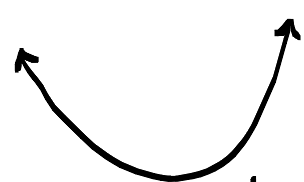
$$-1 = -3 + b \rightarrow 2 = b$$

$$+3 \quad\; +3$$

$$\boxed{y = -\frac{3}{5}x + 2}$$

C. Which of the common functions models the flight of a ball thrown through the air? Explain and draw a sketch.





$y = x^2$

$f(x) = x^2$