

## Assignment #1

### Multiple Choice

Identify the choice that best completes the statement or answers the question.

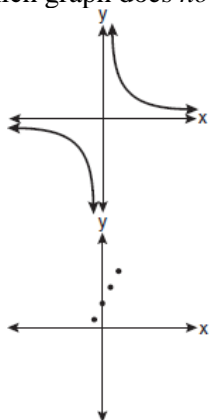
\_\_\_\_ 1. If  $f(x) = \frac{1}{2}x - 3$  and  $g(x) = 2x + 5$ , what is the value of  $(g \circ f)(4)$ ?

- A. -13  
B. 3.5

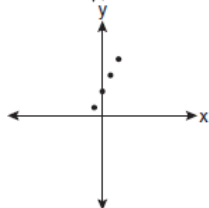
- C. 3  
D. 6

\_\_\_\_ 2. Which graph does *not* represent a function?

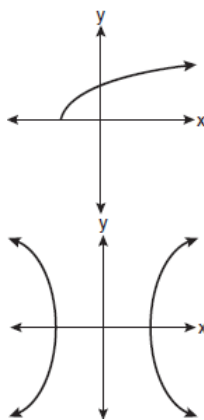
A.



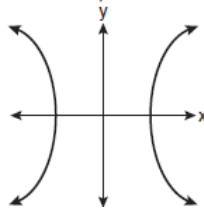
B.



C.

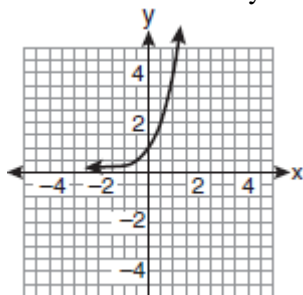


D.

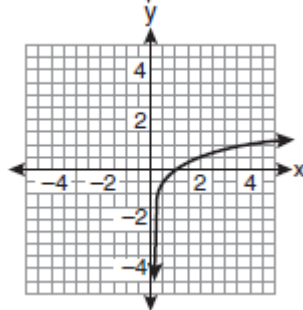


\_\_\_\_ 3. If a function is defined by the equation  $f(x) = 4^x$ , which graph represents the inverse of this function?

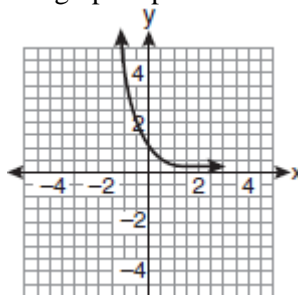
A.



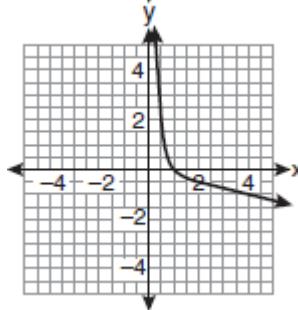
B.



C.



D.



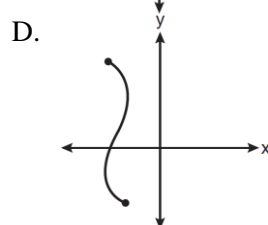
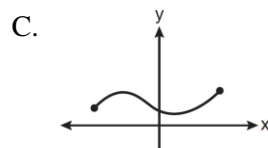
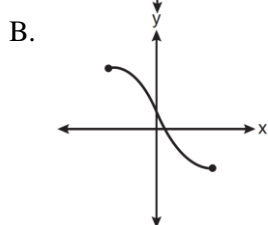
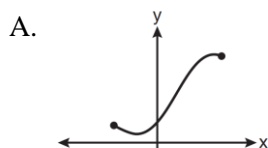
\_\_\_\_ 4. Four points on the graph of the function  $f(x)$  are shown below.  
 $\{(0, 1), (1, 2), (2, 4), (3, 8)\}$

Which equation represents  $f(x)$ ?

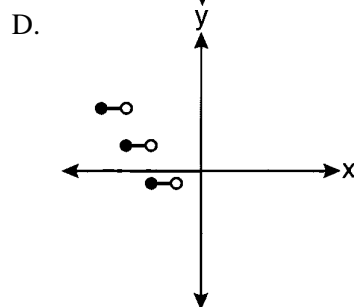
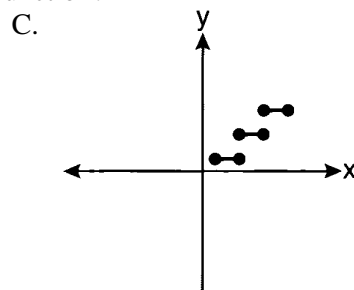
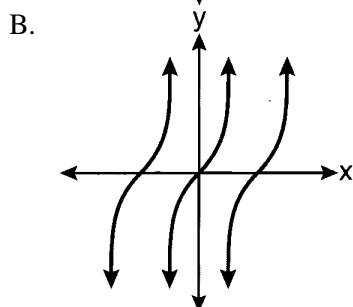
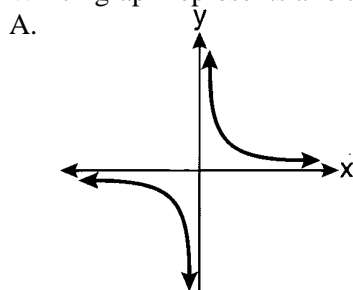
- A.  $f(x) = 2^x$   
B.  $f(x) = 2x$

- C.  $f(x) = x + 1$   
D.  $f(x) = \log_2 x$

\_\_\_\_ 5. Which graph does *not* represent a function?



6. Which graph represents a relation that is *not* a function?



7. If  $f(x) = 4x - x^2$  and  $g(x) = \frac{1}{x}$ , then  $(f \circ g)\left(\frac{1}{2}\right)$  is equal to

- A.  $\frac{4}{7}$   
B.  $-2$

- C.  $\frac{7}{2}$   
D.  $4$

8. What is the range of  $f(x) = |x - 3| + 2$ ?

- A.  $\{x | x \geq 3\}$   
B.  $\{y | y \geq 2\}$

- C.  $\{x | x \in \text{real numbers}\}$   
D.  $\{y | y \in \text{real numbers}\}$

9. Which function is one-to-one?

- A.  $f(x) = |x|$   
B.  $f(x) = 2^x$

- C.  $f(x) = x^2$   
D.  $f(x) = \sin x$

10. Which function is one-to-one?

A.  $k(x) = x^2 + 2$

B.  $g(x) = x^3 + 2$

C.  $f(x) = |x| + 2$

D.  $j(x) = x^4 + 2$

11. If  $f(x) = \sqrt{9 - x^2}$ , what are its domain and range?

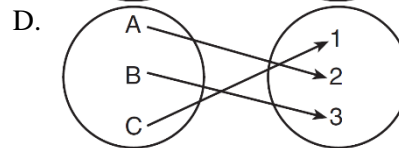
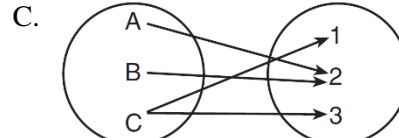
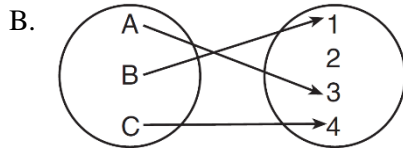
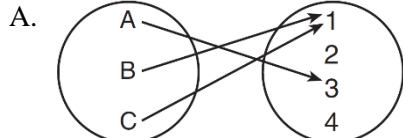
A. domain:  $\{x \mid -3 \leq x \leq 3\}$ ; range:  $\{y \mid 0 \leq y \leq 3\}$

B. domain:  $\{x \mid x \neq \pm 3\}$ ; range:  $\{y \mid 0 \leq y \leq 3\}$

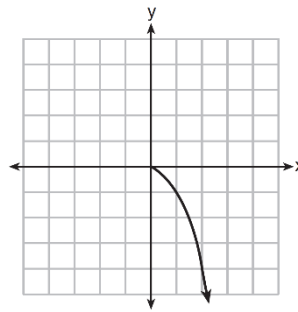
C. domain:  $\{x \mid x \leq -3 \text{ or } x \geq 3\}$ ; range:  $\{y \mid y \neq 0\}$

D. domain:  $\{x \mid x \neq 3\}$ ; range:  $\{y \mid y \geq 0\}$

12. Which diagram represents a relation that is both one-to-one and onto?



13. What is the range of the function shown below?



A.  $x \leq 0$

B.  $x \geq 0$

C.  $y \leq 0$

D.  $y \geq 0$

14. For  $y = \frac{3}{\sqrt{x-4}}$ , what are the domain and range?

A.  $\{x \mid x > 4\}$  and  $\{y \mid y > 0\}$

B.  $\{x \mid x \geq 4\}$  and  $\{y \mid y > 0\}$

C.  $\{x \mid x > 4\}$  and  $\{y \mid y \geq 0\}$

D.  $\{x \mid x \geq 4\}$  and  $\{y \mid y \geq 0\}$

15. If  $f(x) = 2x^2 - 3x + 1$  and  $g(x) = x + 5$ , what is  $f(g(x))$ ?

A.  $2x^2 + 17x + 36$

B.  $2x^2 + 17x + 66$

C.  $2x^2 - 3x + 6$

D.  $2x^2 - 3x + 36$

16. The domain of  $f(x) = -\frac{3}{\sqrt{2-x}}$  is the set of all real numbers

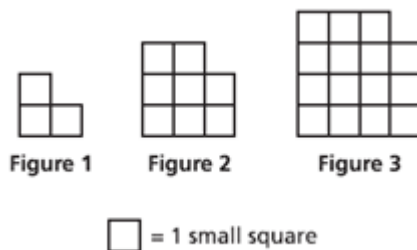
A. greater than 2

B. less than 2

C. except 2

D. between -2 and 2

17. If  $f(x) = 4x^2 - x + 1$ , then  $f(a + 1)$  equals  
 A.  $4a^2 - a + 6$   
 B.  $4a^2 - a + 4$   
 C.  $4a^2 + 7a + 6$   
 D.  $4a^2 + 7a + 4$
18. Which list of ordered pairs does *not* represent a one-to-one function?  
 A.  $(1, -1), (2, 0), (3, 1), (4, 2)$   
 B.  $(1, 2), (2, 3), (3, 4), (4, 6)$   
 C.  $(1, 3), (2, 4), (3, 3), (4, 1)$   
 D.  $(1, 5), (2, 4), (3, 1), (4, 0)$
19. If  $f(x) = 2x^2 + 1$  and  $g(x) = 3x - 2$ , what is the value of  $f(g(-2))$ ?  
 A. -127  
 B. -23  
 C. 25  
 D. 129
20. If  $m = \{(-1, 1), (1, 1), (-2, 4), (2, 4), (-3, 9), (3, 9)\}$ , which statement is true?  
 A.  $m$  and its inverse are both functions.  
 B.  $m$  is a function and its inverse is not a function.  
 C.  $m$  is not a function and its inverse is a function.  
 D. Neither  $m$  nor its inverse is a function.
21. Which interval notation represents the set of all numbers from 2 through 7, inclusive?  
 A.  $(2, 7]$   
 B.  $(2, 7)$   
 C.  $[2, 7)$   
 D.  $[2, 7]$
22. The function  $y = \frac{x}{x^2 - 9}$  is undefined when the value of  $x$  is  
 A. 0 or 3  
 B. 3 or -3  
 C. 3, only  
 D. -3, only
23. The first three figures in a pattern are shown.



- Which function represents  $f(n)$ , the number of small squares in figure  $n$ ?  
 A.  $f(n) = n^2 - 1$   
 B.  $f(n) = 2n^2 + 1$   
 C.  $f(n) = (n + 1)^2 + 1$   
 D.  $f(n) = (n + 1)^2 - 1$
24. If  $f(2) = 13$ , which could be the equation for  $f(x)$ ?  
 A.  $f(x) = x^2 + 8$   
 B.  $f(x) = x + x^2$   
 C.  $f(x) = 2x^3 + 5$   
 D.  $f(x) = 3x^2 + 1$
25. If  $f(x) = 3x^2 + 2x - 1$ , what is  $f(0)$ ?  
 A - C 1  
 . 1 .  
 B 0 D 4  
 . .

Question Answer:

Q1a: Solve the inequality and sketch the solution on the coordinate line.

$$\text{i) } \frac{2}{x} < \frac{3}{x-2} \quad \text{ii) } x^3 + 3x^2 - 2x \geq 0$$

Q1b: Solve for x:

$$\text{i) } |2x - 3| = 2|3x - 5| \quad \text{ii) } \frac{1}{|2x-3|} \leq 3$$

Q2:

a) Find the formula for  $f \circ g$  and  $g \circ f$ , and state the domains of the functions.

$$f(x) = \frac{x}{1+x^2}, \quad g(x) = \frac{1}{x}$$

b) Find a formula for  $f^{-1}(x)$ .

$$f(x) = \begin{cases} \frac{7}{2} - x & x < 2 \\ \frac{3}{x} & x \geq 2 \end{cases}$$

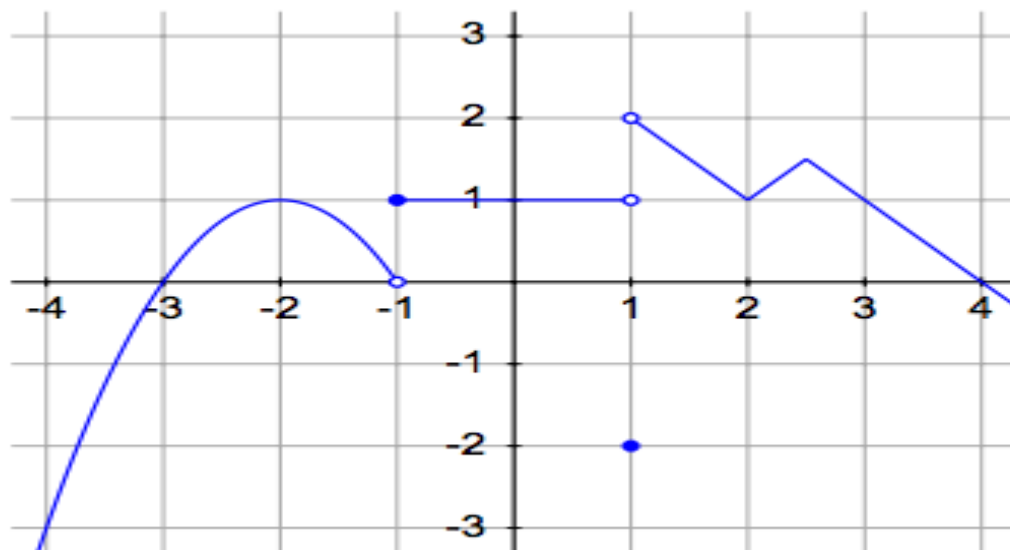
Q3: Sketch the graph of the function.

$$\text{i. } f(x) = -|x - 2| + 5$$

$$\text{ii. } f(x) = \frac{1}{x-1} - 3$$

$$\text{iii. } f(x) = \sqrt[3]{x-3} - 5$$

Q4: Use the given graph of  $f(x)$ .



i) FIND  $\lim_{x \rightarrow -1} f(x)$ ,  $f(-1)$ ,  $\lim_{x \rightarrow 1} f(x)$ ,  $f(1)$  and  $\lim_{x \rightarrow 3} f(x)$

5. Let  $a$  and  $b$  stand for constants and let  $f(x) = \begin{cases} b-x, & x < 1 \\ a(x-2)^2, & x \geq 1 \end{cases}$

a. Find an equation relating  $a$  and  $b$  if  $f$  is to be continuous at  $x = 1$ .

b. Find  $b$  if  $a = -1$ . Graph and show that the function is continuous

c. Find another value of  $b$  where  $f$  is continuous

**Q6:** A lab technician controls the temperature  $T$  inside a kiln. From an initial temperature of 0 degrees Celsius ( $^{\circ}\text{C}$ ), he allows the kiln to increase by  $2^{\circ}\text{C}$  per minute for the next 10 min. After the 10th minute, he allows the kiln to cool at the rate of  $3^{\circ}\text{C}$  per minute. The temperature function  $T$  is defined by

$$T(t) = \begin{cases} 2t, & \text{if } t \leq 10 \\ C^2 - 15C - 3t, & \text{if } t > 10 \end{cases}$$

i) Find  $C$  such that  $T$  is continuous at  $t = 10$  min

ii) Explain why  $T$  must be continuous at  $t = 10$  min.

Q7:

Find the value of  $x$  where the function is discontinuous.

a.  $f(x) = x^3 + 3^x$       b.  $f(x) = \frac{5}{x^2 - 81}$       c.  $f(x) = \frac{x^2 + 2x - 24}{x^2 - 36}$       d.  $f(x) = \frac{2x + 1}{x^2 + 6x + 9}$

