Assignment #1

Multiple Choice
Identify the choice that best completes the statement or answers the question.
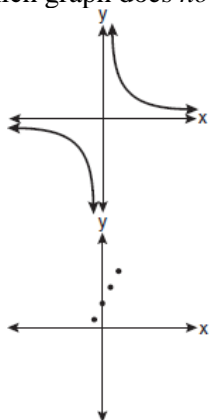
_____ 1. If $f(x) = \frac{1}{2}x - 3$ and $g(x) = 2x + 5$, what is the value of $(g \circ f)(4)$?

    A. −13   C. 3
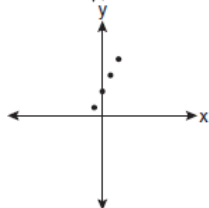   B. 3.5   D. 6

_____ 2. Which graph does *not* represent a function?

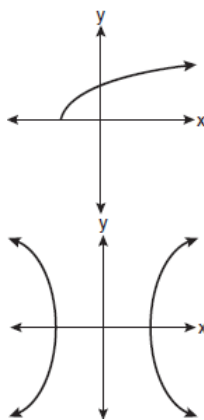   A.   C.
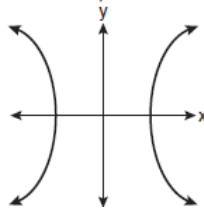
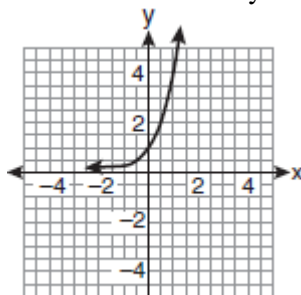   B.   D.

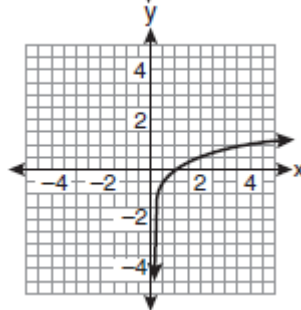_____ 3. If a function is defined by the equation $f(x) = 4^x$, which graph represents the inverse of this function?

    A.   C.
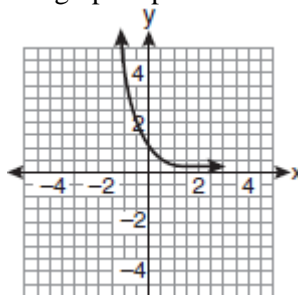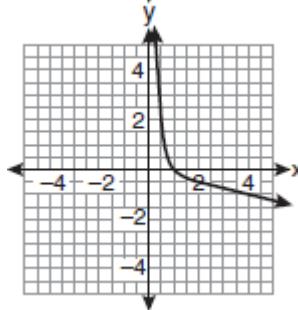
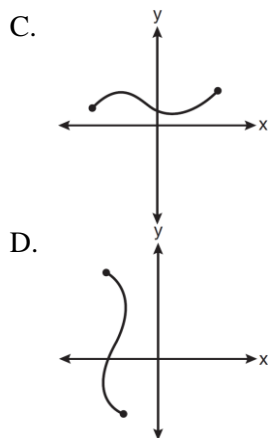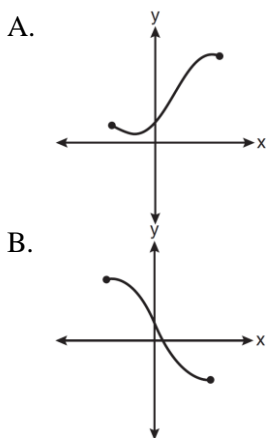   B.   D.

_____ 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. $f(x) = 2^x$ C. $f(x) = x + 1$
    B. $f(x) = 2x$ D. $f(x) = \log_2 x$

_____ 5. Which graph does *not* represent a function?

A.

C.

B.

D.

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

A.

C.

B.

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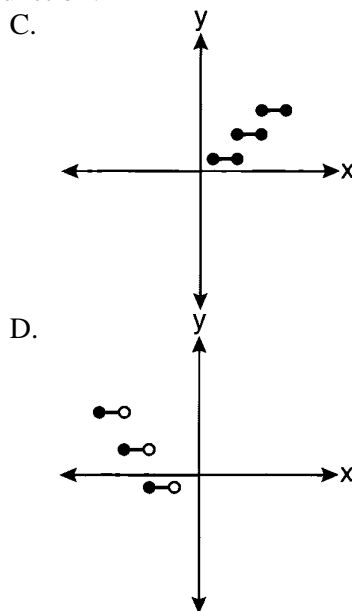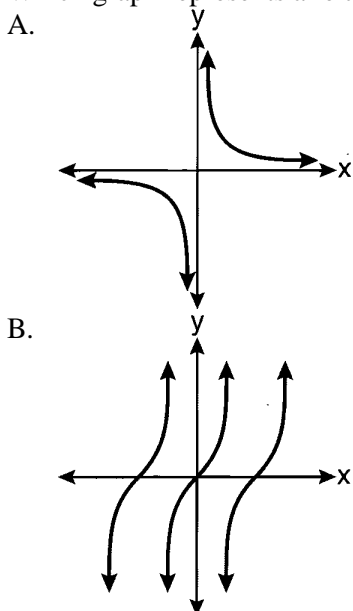
_____ 7. If $f(x) = 4x - x^2$ and $g(x) = \dfrac{1}{x}$, then $(f \circ g)\left(\dfrac{1}{2}\right)$ is equal to

A. $\dfrac{4}{7}$ C. $\dfrac{7}{2}$

B. -2 D. 4

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

A. $\{x \mid x \geq 3\}$ C. $\{x \mid x \in \text{real numbers}\}$

B. $\{y \mid y \geq 2\}$ D. $\{y \mid y \in \text{real numbers}\}$

_____ 9. Which function is one-to-one?

A. $f(x) = |x|$ C. $f(x) = x^2$

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

_____ 10. Which function is one-to-one?

A. $k(x) = x^2 + 2$ C. $f(x) = |x| + 2$
B. $g(x) = x^3 + 2$ D. $j(x) = x^4 + 2$

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

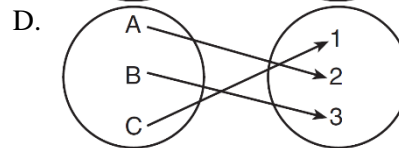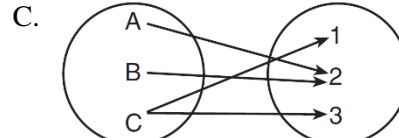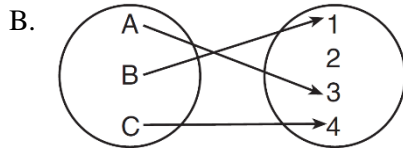A. domain: $\{x \mid -3 \le x \le 3\}$; range: $\{y \mid 0 \le y \le 3\}$
C. domain: $\{x \mid x \le -3 \text{ or } x \ge 3\}$; range: $\{y \mid y \ne 0\}$
B. domain: $\{x \mid x \ne \pm 3\}$; range: $\{y \mid 0 \le y \le 3\}$
D. domain: $\{x \mid x \ne 3\}$; range: $\{y \mid y \ge 0\}$

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

A.
C.
B.
D.
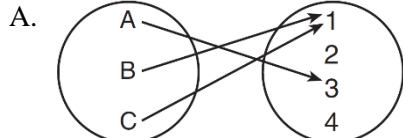
_____ 13. What is the range of the function shown below?
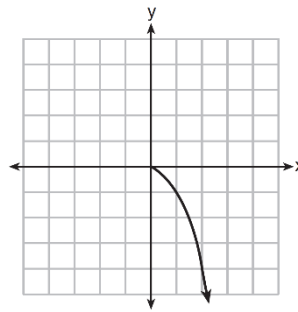
A. $x \le 0$ C. $y \le 0$
B. $x \ge 0$ D. $y \ge 0$

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

A. $\{x \mid x > 4\}$ and $\{y \mid y > 0\}$ C. $\{x \mid x > 4\}$ and $\{y \mid y \ge 0\}$
B. $\{x \mid x \ge 4\}$ and $\{y \mid y > 0\}$ D. $\{x \mid x \ge 4\}$ and $\{y \mid y \ge 0\}$

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

A. $2x^2 + 17x + 36$ C. $2x^2 - 3x + 6$
B. $2x^2 + 17x + 66$ D. $2x^2 - 3x + 36$

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

A. greater than 2 C. except 2
B. less than 2 D. between -2 and 2

_____ 17. If $f(x) = 4x^2 - x + 1$, then $f(a + 1)$ equals

    A. $4a^2 - a + 6$ C. $4a^2 + 7a + 6$

    B. $4a^2 - a + 4$ D. $4a^2 + 7a + 4$

_____ 18. Which list of ordered pairs does *not* represent a one-to-one function?

   A. $(1, -1), (2, 0), (3, 1), (4, 2)$ C. $(1, 3), (2, 4), (3, 3), (4, 1)$

    B. $(1, 2), (2, 3), (3, 4), (4, 6)$ 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 C. 25

    B. -23 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.   C. *m* is not a function and its inverse is a function.

    B. *m* is a function and its inverse is not 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. $(2, 7]$ C. $[2, 7)$

    B. $(2, 7)$ D. $[2, 7]$

_____ 22. The function $y = \dfrac{x}{x^2 - 9}$ is undefined when the value of x is

    A. 0 or 3   C. 3, only

    B. 3 or -3 D. -3, only

_____ 23. The first three figures in a pattern are shown.

Figure 1   Figure 2   Figure 3
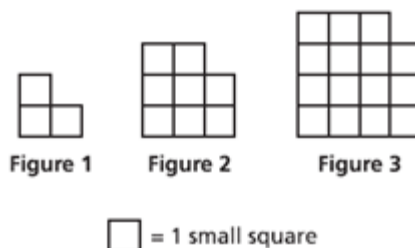
☐ = 1 small square

Which function represents $f(n)$, the number of small squares in figure n?

    A. $f(n) = n^2 - 1$ C. $f(n) = (n + 1)^2 + 1$

    B. $f(n) = 2n^2 + 1$ D. $f(n) = (n + 1)^2 - 1$

_____ 24. If $f(2) = 13$, which could be the equation for $f(x)$?

    A. $f(x) = x^2 + 8$ C. $f(x) = 2x^3 + 5$

    B. $f(x) = x + x^2$ 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.

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

Q1b: Solve for x:

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

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 $f^{-1}(x)$.
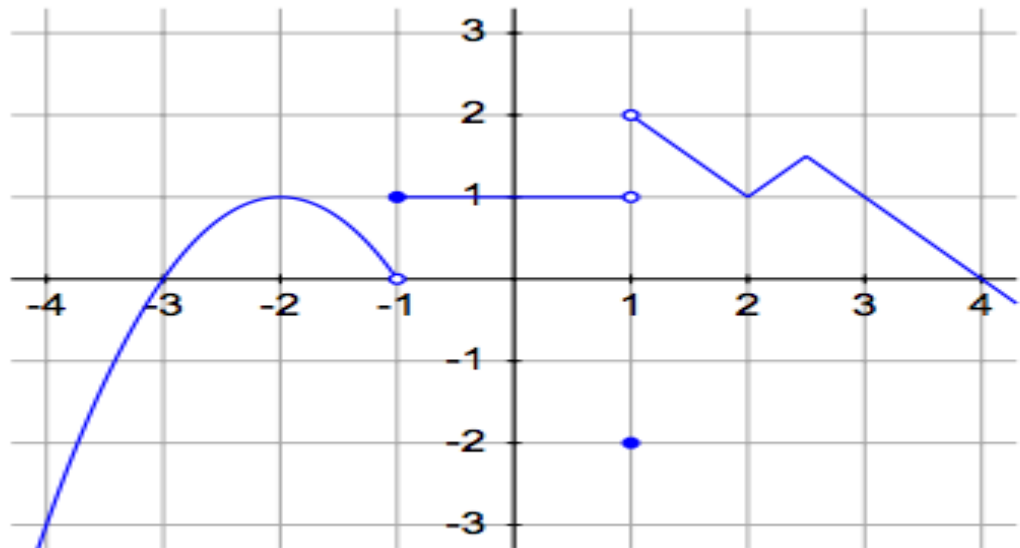$$f(x) = \begin{cases} \dfrac{7}{2} - x & x < 2 \\ \dfrac{3}{x} & x \geq 2 \end{cases}$$

Q3: Sketch the graph of the function.

$$i. f(x) = -|x - 2| + 5$$

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

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

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

i) FIND $\lim_{x\to-1} f(x), f(-1), \lim_{x\to1} f(x), f(1)$ and $\lim_{x\to3} f(x)$

5. Let a and b stand for constants and let $f(x) = \begin{cases} b-x, x<1 \\ a(x-2)^2, x\geq1 \end{cases}$

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 o b where f is continuo

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

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

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. $f(x) = \dfrac{5}{x^2-81}$

c. $f(x) = \dfrac{x^2+2x-24}{x^2-36}$

($f(x) = \dfrac{2x+1}{x^2+6x+9}$