

Use the following functions to answer questions #1, 2, and 3:

$$f(x) = \frac{3x}{x+4} \text{ and } g(x) = x - 1$$

1. Find and simplify  $g(g(6))$ .

A.  $\frac{4}{5}$

B. 25

C.  $\frac{5}{3}$

D. 35

E. None of the above

2. Find and simplify  $(f - g)(-3)$ .

A.  $\frac{23}{7}$

B. -7

C. -13

D. -5

E. None of the above

3. Solve the following equation for  $x$ .

$$(g \circ f)(x) = 0$$

A.  $x = -1, x = 0$

B.  $x = 0, x = 1$

C.  $x = 2$

D.  $x = 1$

E. None of the above

4. Solve the following system of equations for  $x$ .

$$\begin{cases} y = x^2 + 4x - 7 \\ 2x - y = -1 \end{cases}$$

A.  $x = -1, x = 2$

B.  $x = -4, x = 2$

C.  $x = -1, x = 6$

D.  $x = -4, x = 6$

E. None of the above

5. Let  $y = f(x)$  be a function with domain  $D = [-5, 3]$  and range  $R = [-2, 7]$ . Find the domain  $D$  and the range  $R$  for  $y = 4f(x - 3)$ .

A.  $D = [-2, 6], R = [-8, 28]$

B.  $D = [-5, 4], R = \left[-\frac{1}{2}, \frac{7}{4}\right]$

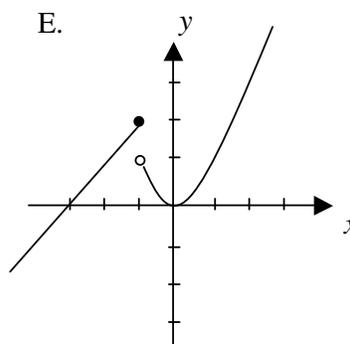
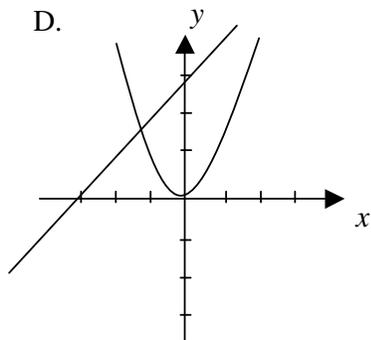
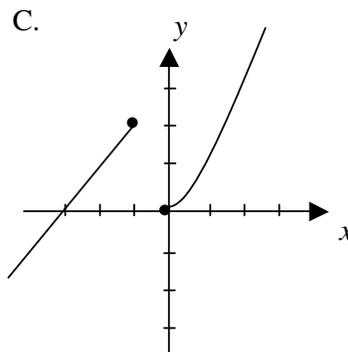
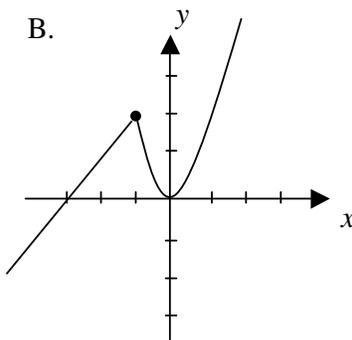
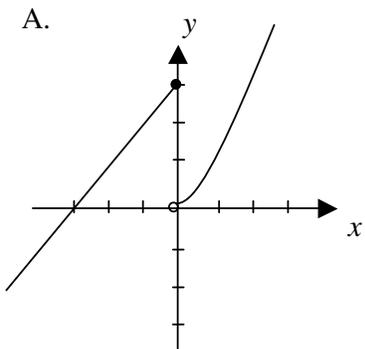
C.  $D = [-2, 6], R = \left[-\frac{1}{2}, \frac{7}{4}\right]$

D.  $D = [-5, 4], R = [-8, 28]$

E. None of the above

6. Which of the following depicts the graph of the following function?

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



7. Given the function,  $f(x) = 4 - \frac{5}{x}$ , find the inverse function,  $f^{-1}$ .

A.  $f^{-1}(x) = \frac{x}{4x-5}$

B.  $f^{-1}(x) = \frac{5}{4-x}$

C.  $f^{-1}(x) = \frac{5-4x}{20}$

D.  $f^{-1}(x) = \frac{4x-5}{x}$

E.  $f^{-1}(x) = \frac{20-x}{5}$

8. Solve the following inequality. Express your answer in interval notation.

$$\frac{(x+2)(x-1)}{x+5} < 0$$

A.  $(-\infty, -5) \cup (-2, 1)$

B.  $(-2, 1)$

C.  $(-5, -2) \cup (1, \infty)$

D.  $(-\infty, -2) \cup (1, \infty)$

E. None of the above

9. Express the parabola  $f(x) = 2x^2 - 4x + 5$  in standard form.

A.  $f(x) = 2(x+1)^2 + 11$

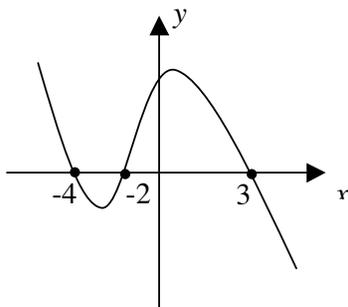
B.  $f(x) = 2(x-1)^2 + 4$

C.  $f(x) = 2(x-1)^2 + 3$

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

E. None of the above

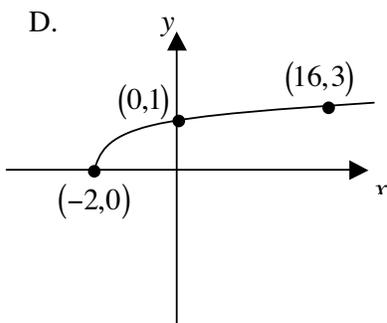
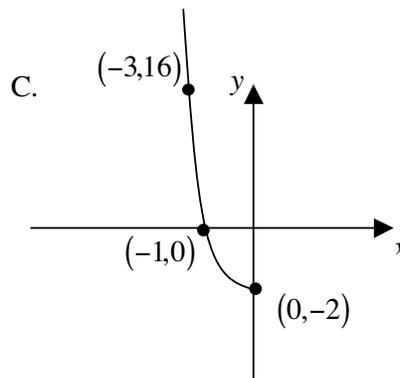
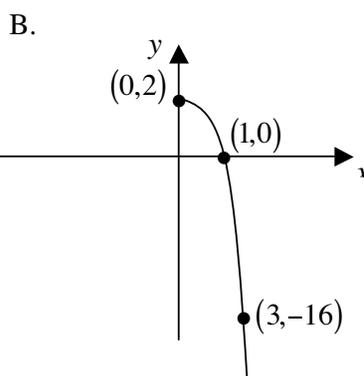
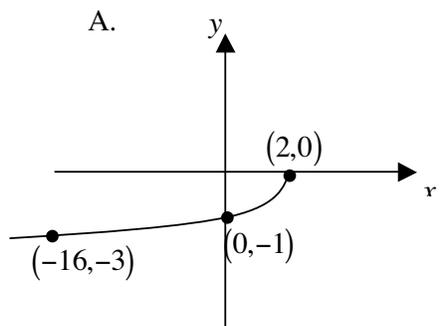
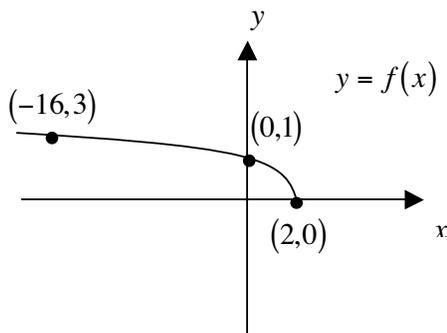
10. Given below is the graph of a function,  $y = f(x)$ . Find the intervals for which  $f(x) \geq 0$ .



- A.  $(-\infty, -4] \cup [3, \infty)$   
 B.  $[-4, -2] \cup [3, \infty)$   
 C.  $[-4, 3]$   
 D.  $(-\infty, -4] \cup [-2, 3]$   
 E. None of the above
11. Find the standard equation of a parabola whose y-coordinate of the vertex is 4 and whose x-intercepts are  $-3$  and  $1$ .
- A.  $y = -\frac{7}{4}(x+1)^2 + 4$   
 B.  $y = -(x+1)^2 + 4$   
 C.  $y = -\frac{1}{4}(x-1)^2 + 4$   
 D.  $y = -\frac{3}{16}(x-1)^2 + 4$   
 E. None of the above
12. The monthly population of a certain town is directly proportional to the cube of the number of available jobs in that month and inversely proportional to the sum of the number of crimes committed and the number of streets under construction in that month. In April, there were 320 available jobs, 52 crimes committed, and 28 streets under construction. The population for April was 245,760 people. Find the constant of proportionality,  $k$ .
- A.  $k = 0.6$   
 B.  $k = 10.92$   
 C.  $k = 1.7$   
 D.  $k = 7.95$   
 E. Cannot be determined
13. Ten liters of a 30% acid solution is obtained by mixing a 20% solution with a 50% solution. If  $x$  represents the amount of the 20% solution used, find the equation to solve for  $x$ . Do not solve.

- A.  $.2x + .5x = (.3)(10)$   
 B.  $.2(10 - x) + .5x = .3$   
 C.  $.2x + .5(10 - x) = .3$   
 D.  $.2(10 - x) + .5(10 - x) = (.3)(10)$   
 E.  $.2x + .5(10 - x) = (.3)(10)$

14. Given below is the graph of a one-to-one function,  $f$ . Which of the following depicts the graph of the inverse function,  $f^{-1}$ .



E. None of these

15. An object is projected vertically upward from the top of a cliff with an initial velocity of 96 ft./sec. Its distance,  $s(t)$ , in feet above the ground after  $t$  seconds is given by  $s(t) = -16t^2 + 96t + 50$ . Find the object's maximum distance above the ground.

- A. 224 feet
- B. 194 feet
- C. 94 feet
- D. 50 feet
- E. None of the above

