

1. Given the functions  $f(x) = \sqrt{3-x}$  and  $g(x) = \frac{1}{x^2+1}$ , determine which of the following is undefined. (Lesson 27)

- A.  $(gf)(0)$
- B.  $\left(\frac{f}{g}\right)(0)$
- C.  $(fg)(-1)$
- D.  $\left(\frac{g}{f}\right)(3)$
- E. None of the above

2. Given in each table are several values of two functions  $F$  and  $G$ . Use this information to find  $(F \circ G)(-1)$ . (Lesson 27)

$x$	-2	-1	9
$F(x)$	0	2	11

$x$	-5	-1	2
$G(x)$	4	9	-3

- A. -3
- B. 2
- C. 11
- D. 0
- E. Cannot be determined

3. Given the functions  $f(x) = x^3 + 1$  and  $g(x) = \frac{1}{x}$ , find the zero(s) of the composite function  $g(f(x))$ ? (Lesson 27)

- A. The composite function has one zero. It is positive.
- B. The composite function has one zero. It is negative.
- C. The composite function has one zero. It is zero.
- D. The composite function has more than one zero.
- E. The composite function has no zeros.

4. Solve the inequality  $\frac{x^2+9}{x^2-25} \leq 0$ , and express the solution set in interval notation. (*Lesson 28*)

A.  $(-\infty, -5] \cup [5, \infty)$

B.  $[-5, -3] \cup [3, 5]$

C.  $[-5, 5]$

D.  $(-5, -3] \cup [3, 5)$

E.  $(-5, 5)$

5. Solve the inequality  $x^3 < x^2$ , and express the solution set in interval notation. (*Lesson 28*)

A.  $(-\infty, 0) \cup (0, 1)$

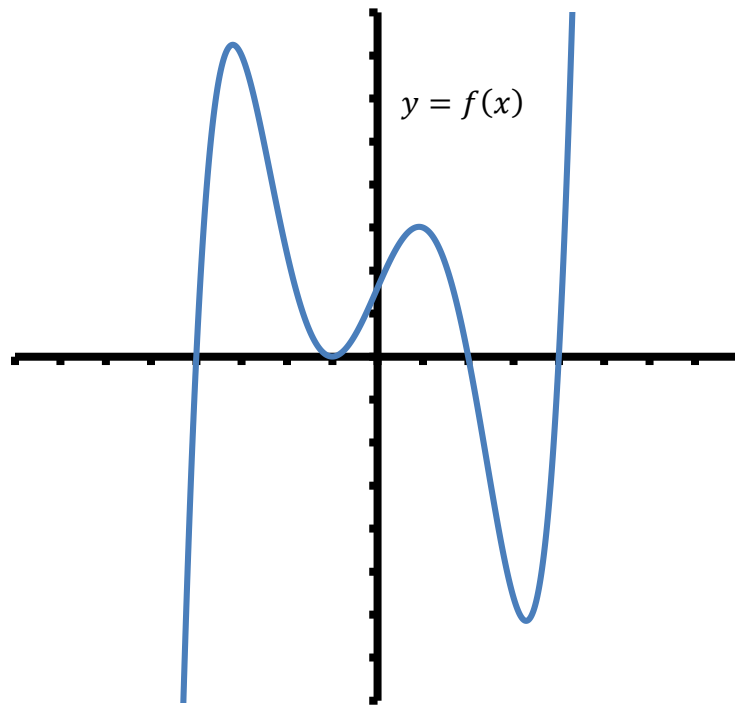
B.  $(-\infty, 1)$

C.  $(1, \infty)$

D.  $[1, \infty)$

E.  $(\infty, 1]$

6. Which of the following sign charts corresponds with the graph of the function  $y = f(x)$  given below?  
(assume each tick mark represents 1 unit) (*Lesson 29*)



- A. sign of  $f(x)$ :  $\begin{array}{ccccccccc} & & -4 & & 2 & & 4 & & \\ + & | & - & | & + & | & - & \end{array}$
- B. sign of  $f(x)$ :  $\begin{array}{ccccccccc} & & -4 & & 2 & & 4 & & \\ - & | & + & | & - & | & + & \end{array}$
- C. sign of  $f(x)$ :  $\begin{array}{ccccccccc} & & -4 & & -1 & & 2 & & 4 & & \\ + & | & - & | & - & | & + & | & - & \end{array}$
- D. sign of  $f(x)$ :  $\begin{array}{ccccccccc} & & -4 & & -1 & & 2 & & 4 & & \\ - & | & + & | & + & | & - & | & + & \end{array}$

E. None of the above

7. Which of the following statements is/are true regarding the function  $f(x) = \frac{1}{6}(x+2)(x-3)(x-4)$ ?  
(Lesson 29)

- I. The y-intercept is  $(0, \frac{1}{6})$
- II. The range is  $(-\infty, \infty)$
- III. The function is odd.

- A. II only
- B. I and II only
- C. II and III only
- D. All three statements are true
- E. None of the above

8. If  $f(x) = x^3 - 2kx^2 + 3x - 8k$ , find  $k$  such that the graph of  $f$  contains the point  $(-1, 15)$ . Determine which interval contains  $k$ . (Lesson 29)

- A.  $k < -2$
- B.  $-2 < k < -1$
- C.  $-1 < k < 1$
- D.  $1 < k < 2$
- E.  $k > 2$

9. Suppose  $y$  is directly proportional to the square root of  $x$  and inversely proportional to the sum of  $r$  and  $s$ . Find the constant of proportionality if  $y = 5$  when  $x = 2$ ,  $r = 4$  and  $s = 8$ . (*Lesson 29*)

- A.  $\frac{160}{\sqrt{2}}$   
B.  $\frac{60}{\sqrt{2}}$   
C. 30  
D. 15  
E. None of the above

10. Solve the system of equations and find the value(s) for  $y$ . (*Lesson 31*)

$$\begin{cases} 2x + y = 1 \\ y = -2(x + 4)^2 + 9 \end{cases}$$

- A.  $y = -5, y = -7$   
B.  $y = -3, y = -4$   
C.  $y = 7, y = 9$   
D. The system no solution  
E. The system has infinitely many solutions

11. Solve the system of equations and determine in which quadrant the graphs of the equations will intersect. (*Lesson 31*)

$$\begin{cases} y = \frac{1}{x} \\ x + y = -2 \end{cases}$$

- A. *QI*  
B. *QII*  
C. *QIII*  
D. *QIV*  
E. The graphs do not intersect

12. Solve the system of equations and determine which of the following statements is true. (*Lesson 32*)

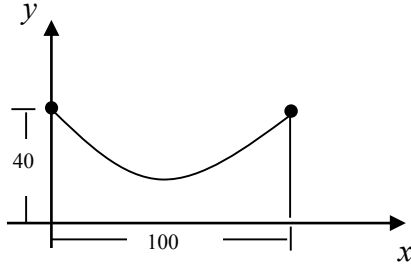
$$\begin{cases} 3x - y = -6 \\ 9x + 3y = 18 \end{cases}$$

- A. There is only one solution.  
It lies above the  $x$ -axis
- B. There is only one solution.  
It lies below the  $x$ -axis
- C. There is only one solution.  
It lies on the  $x$ -axis
- D. The system no solution
- E. The system has infinitely many solutions

13. If an object is projected vertically upward from an altitude of  $a$  feet with an initial velocity of  $v \frac{ft}{sec}$ , then its distance  $s(t)$  above the ground after  $t$  seconds is  $s(t) = -16t^2 + vt + a$ . If  $s(1) = 99$  and  $s(4) = 114$ , what is the value of  $v$ ? (*Lesson 33*)

- A. The value of  $v$  is less than 20
- B. The value  $v$  is between 20 and 40
- C. The value  $v$  is between 40 and 60
- D. The value  $v$  is between 60 and 80
- E. The value  $v$  is more than 80

14. A section of a suspension bridge is in the shape of a parabola (shown below). The supports on either end are 100 yards apart and rise 40 yards off the ground. The lowest point of the suspension cable is 20 yards off the ground. Find the standard equation for this parabola. (*Lesson 26*)



- A.  $y = \frac{3}{125}(x - 50)^2 + 20$   
B.  $y = \frac{2}{5}(x - 100)^2 + 20$   
C.  $y = \frac{1}{125}(x - 50)^2 + 20$   
D.  $y = \frac{1}{1000}(x - 100)^2 + 20$   
E.  $y = \frac{1}{10}(x - 20)^2 + 50$

15. The ideal gas law states that the volume  $V$  that a gas occupies is directly proportional to the product of the number  $n$  of moles of gas and the temperature  $T$  (in K) and is inversely proportional to the pressure  $P$  (in atmospheres). What is the effect on the volume if the both the temperature and the pressure are doubled? (*Lesson 30*)

- A. Volume is doubled  
B. Volume is quadrupled  
C. Volume is halved  
D. There is no effect on volume  
E. None of the above