

1) Which one of the following equations DOES NOT represent y as a function of x ?

A) $x^2 - |y| = 4$

B) $x^2 - 2y = 8$

C) $2x - y = -6$

D) $|x| - 3y = 4$

E) $x^4 - y^3 = 3$

2) If $h \neq 0$ and $f(x) = x^2 - 1$, then $\frac{f(x+h) - f(x)}{h} =$

A) $2x + h$

B) $2x + h + 1$

C) $2x - h - 1$

D) $2x - h$

E) $h - 2$

3) The equation of the line that passes through the center of the circle $(x - 1)^2 + (y + 2)^2 = 5$, and parallel to the line $y = 3x - 11$, is

A) $3x - y - 5 = 0$

B) $3x - y + 5 = 0$

C) $x - 3y - 5 = 0$

D) $x + 3y - 5 = 0$

E) $3x + y + 5 = 0$

4) The range of the function $f(x) = \begin{cases} x^2 - 1 & \text{if } x \geq 0 \\ \frac{|x|}{x} & \text{if } x < 0 \end{cases}$, is

A) $[-1, \infty)$

B) $(-\infty, 1]$

C) $(-\infty, \infty)$

D) $(0, \infty)$

E) $(-1, \infty)$

5) If $M(14, 11)$ is the midpoint of the line segment joining the points $A(x, 14)$ and $B(10, y)$, then the distance between the points A and B is

- A) 10
- B) 14
- C) 100
- D) 5
- E) 25

6) If $\sqrt{-4}\sqrt{-9} + 2i^{99} - \sqrt[3]{-27} = a + bi$, where $i = \sqrt{-1}$, then $a + b =$

- A) - 5
- B) - 11
- C) 5
- D) 11
- E) 7

7) If the point $(x, -2)$, $x > 0$, is 5 units from the points $(0, -5)$, then $3x - 1 =$

- A) 11
- B) 14
- C) 8
- D) 5
- E) 20

8) Which one of the following statements is TRUE about the function

$$f(x) = \frac{x|x|}{\sqrt[3]{x}}$$

- A) f is an even function
- B) f is an odd function
- C) f is neither an odd function, nor an even function
- D) $f(-18) = -f(18)$
- E) $f(0) = 0$

9) If the circle $(x - a)^2 + (y - b)^2 = 4$, $a < 0$, $b > 0$, is tangent to both axes ,
then $2a + 3b =$

- A) 2
- B) 4
- C) - 2
- D) - 4
- E) 6

10) The equation of the line that passes through the point $(- 1, - 2)$ and
perpendicular to a line with undefined slope is

- A) $y = - 2$
- B) $x = - 1$
- C) $y = - 1$
- D) $x = - 2$
- E) $x + y = - 2$

11) If the quadratic equation $2x^2 + 16x + 30 = 0$ is written in the form $(x - a)^2 = b$, then $a + b =$

- A) - 3
- B) - 4
- C) - 2
- D) 1
- E) 5

12) If $x = a \mp b\sqrt{2}$ are the solutions of the quadratic equation $x^2 - 6x + 7 = 0$, then $a^2 + b^2 =$

- A) 10
- B) 13
- C) 5
- D) 25
- E) 20

13) The sum of all the solutions of $-\frac{3}{2}|x - 7| - \frac{5}{2} = -7$, is equal to

- A) 14
- B) 12
- C) - 14
- D) 6
- E) - 6

14) The sum of all the solutions of the equation $|x - 2|^2 - |2 - x| = 6$ is

- A) 4
- B) 8
- C) - 1
- D) - 8
- E) 1

15) The product of all the solutions of $\sqrt{2x+1} + 1 = x$, is equal to

- A) 4
- B) 0
- C) 2
- D) -2
- E) 1

16) The solution set, in interval notation, of the inequality $\frac{1}{x-3} \geq \frac{1}{x-5}$, is

- A) (3, 5)
- B) $(-\infty, 3) \cup (5, \infty)$
- C) (-5, -3)
- D) [3, 5]
- E) $(-\infty, -5) \cup (-3, \infty)$

17) If a is the real part and b is the imaginary part of the complex number

$$z = \frac{(3 - 4i)(3 + 4i)}{10 - 5i}, \quad \text{where } i = \sqrt{-1}, \text{ then } a + b =$$

A) 3

B) 15

C) 5

D) 1

E) -5

18) If $f(x) = \begin{cases} -|-x| & \text{if } x < 0 \\ -2 & \text{if } 0 \leq x < 4 \\ \lceil x - 4 \rceil & \text{if } x \geq 4 \end{cases}$, where $\lceil \cdot \rceil$ is the greatest

integer function, then $f(-2) + f(0) + f(2\pi) =$

A) -2

B) -6

C) 2

D) -1

E) 6

19) If $(-\infty, m) \cup (n, \infty)$ is the solution set of the inequality

$$\left| \frac{5}{3} - \frac{1}{2}x \right| + \frac{1}{3} > \frac{4}{3}, \text{ then } n - m =$$

A) 4

B) 15

C) $\frac{20}{3}$

D) $\frac{11}{3}$

E) -4

20) If the solution set of $|x - a| < 1 - 2a$, is $-10 < x < 4$, then $a =$

A) -3

B) -5

C) -6

D) -4

E) -7