

1) The sum of all the solution(s) of the equation $\sqrt[4]{x+3} = \sqrt{x+1}$ is:

A) 1

B) 4

C) -2

D) 2

E) 3

2) The sum of all the solution(s) of the equation $(x-2)^{-2} - (x-2)^{-1} = 2$ is:

A) $\frac{7}{2}$

B) 1

C) -1

D) $\frac{9}{2}$

E) $-\frac{7}{2}$

3) The solution set, in interval notation, of the inequality $\frac{4}{x} \leq x$ is:

- A) $[-2, 0) \cup [2, \infty)$
- B) $(-\infty, -2] \cup (0, 2]$
- C) $(-\infty, -2] \cup [2, \infty)$
- D) $[-2, 2]$
- E) $[-2, 0) \cup (0, 2]$

4) If the solution set of the inequality $\frac{2}{|x+2|} \leq 1$ is given by

$(-\infty, m] \cup [n, \infty)$, then $m + n =$

- A) -4
- B) 12
- C) 6
- D) -2
- E) 10

5) If $f(x) = \frac{1}{x}$, then the difference quotient $\frac{f(1+h) - f(1)}{h}$, $h \neq 0$, is equal to:

A) $\frac{-1}{1+h}$

B) $\frac{2}{1+h}$

C) $\frac{-h}{1+h}$

D) $\frac{h}{1+h}$

E) $\frac{-1}{(1+h)h}$

6) Which one of the following equations defines y as a function of x ?

A) $y = |x|$

B) $y^2 = x$

C) $|y| = x + 1$

D) $x^2 + y^2 = 1$

E) $x = 1$

7) The graph of the function f below, is decreasing on:

- A) $(0, 2)$
- B) $(-3, 1)$
- C) $(2, \infty)$
- D) $(-\infty, 0) \cup (2, \infty)$
- E) $(-\infty, 1) \cup (2, \infty)$

8) The sum of all the solutions of the equation $\frac{x}{x-2} + \frac{1}{x+2} = \frac{8}{x^2-4}$ is:

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

- 9) The solution set of the quadratic equation $x^2 - \sqrt{29}x - 1 = 0$ contains
- A) one positive and one negative irrational solutions
 - B) one positive and one negative rational solutions
 - C) one positive irrational solution only
 - D) one negative irrational solution only
 - E) one positive rational solution only
- 10) If the quadratic equation $kx^2 + 6x + k = 0$, $k > 0$, has exactly one real solution then $2k - 1 =$
- A) 5
 - B) 11
 - C) 9
 - D) 7
 - E) 13

- 11) If $2x^2 + 2y^2 + 12x - 20y + 50 = 0$ has center (h, k) and radius r , then $h + k + r =$
- A) 5
- B) -1
- C) 3
- D) -3
- E) 0
- 12) If the point $P(x, -x)$ is equidistant from the points $C(1, 0)$ and $D(0, -3)$, then $x =$
- A) 2
- B) 1
- C) -1
- D) -3
- E) -2

13) If $\sqrt{-4}\sqrt{-9} + \sqrt[3]{-8} + \frac{5}{2 + i^{27}} = a + bi$, then $a + b =$

A) - 5

B) 3

C) 11

D) 0

E) 9

14) If (m, n) is the midpoint of the line segment joining the center of the circle $(x - 3)^2 + (y + 4)^2 = 10$ and the origin, then $m + n =$

A) $-\frac{1}{2}$

B) 7

C) 3

D) $\frac{1}{2}$

E) $\frac{7}{2}$

15) Given the function $f(x) = \begin{cases} -2 & \text{if } x \leq -1 \\ x^2 + 1 & \text{if } -1 < x \leq 1 \\ \lfloor x - 1 \rfloor & \text{if } x > 1 \end{cases}$,

where $\lfloor \cdot \rfloor$ is the greatest integer function, then

$$f(-1) + f(0) + f(\pi) =$$

A) 1

B) 5

C) -1

D) 2

E) -2

- 16) The y -intercept of the line passing through the point $(-1, 3)$ and perpendicular to the line $2x + 3y = -4$ is:

A) $\frac{9}{2}$

B) $\frac{7}{3}$

C) 9

D) $-\frac{2}{3}$

E) $-\frac{9}{3}$

- 17) If $(a, 0)$ and $(b, 0)$ are the x -intercepts of the equation $y = \sqrt[3]{1 - x^2} + 2$ then $|a| + |b| =$

A) 6

B) 4

C) 10

D) 2

E) 8

- 18) The graph of the equation $y = \frac{x^2 + |x|}{2x}$ is symmetric with respect to:
- A) the origin only
 - B) the y -axis only
 - C) the x -axis only
 - D) the x -axis, the y -axis, and the origin
 - E) the x -axis and the y -axis only
- 19) If the graph of the equation of the circle $(x-1)^2 + (y-k)^2 = 16 - k^2$ is tangent to the x -axis, then $k^2 =$
- A) 8
 - B) 9
 - C) 16
 - D) 25
 - E) 4

20) If f is a linear function such that $f(1) = -1$, $f(4) = k - 2$ and $f(3) = k$, then $k =$

A) -5

B) 5

C) 2

D) -2

E) -1