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 $\sqrt{-4}\sqrt{-9} + \sqrt[3]{-8} + \dfrac{5}{2 + i^{27}} = a + bi$, 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) $-\dfrac{1}{2}$

B) 7

C) 3

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

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

15) Given the function $f(x) = \begin{cases} -2 & \text{if } x \le -1 \\ x^2 + 1 & \text{if } -1 < x \le 1 \\ [\![x - 1]\!] & \text{if } x > 1 \end{cases}$,
where $[\![\ ]\!]$, 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 $y = \dfrac{x^2 + |x|}{2x}$ 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