

### **1.8: Solving Absolute value equations and Inequalities**

1. 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

2. 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

3. If  $(-\infty, m) \cup (n, \infty)$  is the solution set of the inequality  $\left|\frac{5}{3} - \frac{1}{2}x\right| + \frac{1}{3} > \frac{4}{3}$ , then  $n - m =$

A) 4

B) 15

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

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

E)  $-4$

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

A) -3

B)  $-5$

C) -6

D)  $-4$

E)  $-7$

5. If  $x \leq -\frac{1}{2}$ , then the solution set of the inequality  $|2x - 1| \geq |x^2 - 2x|$ , is

A)  $\left[-1, -\frac{1}{2}\right]$

B)  $\emptyset$

C)  $[-2, -1]$

D)  $(-\infty, -1]$

E)  $\left(-\infty, -\frac{1}{2}\right]$

6. The solution set of the inequality  $8 + 3\left|x - \frac{1}{2}\right| \geq 2$  is

A)  $(-\infty, \infty)$

B)  $\left(-\infty, -\frac{3}{2}\right] \cup \left[\frac{5}{2}, \infty\right)$

C)  $\left[-\frac{3}{2}, \frac{5}{2}\right]$

D)  $(-\infty, 0) \cup (0, \infty)$

E)  $\emptyset$

7. The solution set of  $||x + 1| - 2| = 5$  contains

- A) two solutions
- B) one solution
- C) three solutions
- D) four solutions
- E) five solutions.

8. The sum of the solutions of the equation  $\frac{|x-1|+2}{1+|x-1|} - \frac{3}{2} = 0$  is equal to

- A) 2
- B) 1
- C) 0
- D) -1
- E) -5

9. The number of solutions of the equation  $|2x - 1|^3 - 5|2x - 1|^2 + |8x - 4| = 0$  is

A) 5

B) 3

C) 4

D) 0

E) 6

10. The solution set in interval notation of the inequality  $\left| \frac{1}{2} - 2x \right| \geq \frac{1}{2}$  is

A)  $(-\infty, 0] \cup [1/2, \infty)$

B)  $(-\infty, 0] \cup [1, \infty)$

C)  $(-\infty, 1/4] \cup [1/2, \infty)$

D)  $(-\infty, 0] \cup [1/4, \infty)$

E)  $(-\infty, 1/2) \cup [1, \infty)$

11. The solution set of the compound inequality  $-3|x| + 6 < 12$  and  $8 - |2x - 1| \geq 6$  is equal to

A)  $[-1/2, 3/2]$

B)  $(-\infty, \infty)$

C)  $[-1/2, 0) \cup (0, 3/2]$

D)  $(-\infty, 1/2] \cup [3/2, \infty)$

E) the empty set  $\emptyset$

12. If the solution set of  $\left|x + \frac{6}{k+1}\right| \leq \frac{3}{k+1}$  is  $[-3, -1]$ , then  $k =$

A)  $\{2\}$

B)  $\{2, -3\}$

C)  $\{-1/2, 2\}$

D)  $\{-2, -4\}$

E)  $\emptyset$

13. The sum of all solutions of the equation  $\frac{5}{2} - 4|3x - 6| = -\frac{19}{3}$

A) 4

14. If  $|3 - 2x| \leq 5$  is equivalent to  $m \leq 5x + 2 \leq n$ ,

A)  $m = -3$  and  $n = 22$

15. The solution set of the equation  $\frac{2|x+2|}{3} - \frac{1}{2} = \frac{4x+5}{6}$

A)  $[-2, \infty)$

16. The solution set, in interval notation, of the inequality  $2 < |x - 1| < 3$  is equal to

A)  $(-2, -1) \cup (3, 4)$

17. If  $A$  is the solution set of  $|3 - 2x| \leq 5$  and  $B$  is the solution set of  $|x - 2| > 1$ , then  $A \cap B =$

A)  $[-1, 1) \cup (3, 4]$

18. Let  $A$  be the solution set of the inequality  $4|x - 3| > 12$ , and  $B$  is the solution set of the inequality  $|5 - 3x| \leq 7$ , then  $A \cap B =$

A)  $\left[-\frac{2}{3}, 0\right)$

19. The solution set, in interval notation, of the inequality  $\left| \frac{2}{3}x - 1 \right| - 2 > \frac{1}{3}$  is

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

20. The sum of the solutions of the equation  $\left| \frac{6x+1}{x-1} \right| = 3$  is equal to

A)  $-\frac{10}{9}$

21. The solution set of the equation  $|-4 - 3x| = |2 - 3x|$  contains:

A) only one element

22. The solution set of the inequality  $\left|\frac{1}{2}x + \frac{2}{3}\right| > 3$  in interval notation is:

A)  $\left(-\infty, -\frac{22}{3}\right) \cup \left(\frac{14}{3}, \infty\right)$

23. The solution set of the equation  $|5x - 1| = |2x + 3|$  contains:

A) one positive and one negative rational number

24. The solution set of the inequality  $\left| \frac{2x+5}{x} \right| \leq 1$ , in interval notation, is:

A)  $\left[ -5, -\frac{5}{3} \right]$

25. The sum of the solutions of  $|(x + 2)^2| = |(x + 2)|$  is equal to

A) -6

26. The sum of all the solutions of  $|x - 6|^2 - 3|x - 6| - 4 = 0$  is equal to

A) 12

B) 10

C) 25

D) 20

E) 15

27. The number of solutions of the equation  $|x^2 - 2| = |x|$  is

A) 4

B) 1

C) 2

D) 5

E) 3

28. The sum of all the solutions of the equation  $|x - 1| = |3x + 2|$  is

A)  $-\frac{7}{4}$

B) 1

C) 0

D)  $-\frac{1}{4}$

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

29. The sum of all the solutions of the equation  $|x - 1|^2 - 3|x - 1| - 4 = 0$  is

A) 2

B) 5

C) - 2

D) - 3

30. The solution set of the inequality  $\left| \frac{3}{x-6} \right| > 1$  is

A)  $(-\infty, 3) \cup (9, \infty)$

B)  $(3, 6) \cup (6, 9)$

31. The solution set of the inequality  $|x - 5| \geq -3$  is

A)  $(-\infty, \infty)$

32. The solution set of the equation  $\frac{1}{x+6} - \frac{|4x-7|}{x^2+5x-6} = \frac{1}{x-1}$  consists of

A) no real solution.

33. The solution set of the inequality  $4 - 2 \left| x - \frac{1}{2} \right| < 5$  is

A)  $(-\infty, \infty)$

B)  $\left(-\infty, \frac{1}{2}\right)$

C)  $[0, 1]$

D)  $\emptyset$

E)  $\left(-\frac{1}{2}, \infty\right)$

34. The number of the solution(s) for the equation  $|x + 3|^2 + |x + 3| = 0$  is equal to

A) 1

B) 0

C) 2

D) 3

E) 4

35. If  $x^2|y| + y|x^2| = 0$ , then

A)  $x = 0$  or  $y \leq 0$

B)  $x = 0$  or  $y > 0$

C)  $x < 0$  or  $y \leq 0$

D)  $x > 0$  or  $y \geq 0$

E)  $x < 0$  or  $y > 0$

36. The solution set of the absolute value inequality  $|x|^2 + |x| \geq 2$ , is

A)  $(-\infty, -1] \cup [1, \infty)$

B)  $(-\infty, -2] \cup [1, \infty)$

C)  $(-\infty, -2] \cup [2, \infty)$

D)  $(-\infty, -1]$

E)  $(-\infty, -2]$

37. If  $x < 3$ , then  $\sqrt{x^2 - 6x + 9} - x - 2 =$

- A)  $2x - 1$
- B)  $-2x + 1$
- C)  $-5$
- D)  $-1$
- E)  $1$

38. If  $|3 - 2x| \leq 5$  is equivalent to  $m \leq 5x + 2 \leq n$ , then:

A)  $m = -3$  and  $n = 22$

39. The solution set of the absolute value inequality  $|x|^2 + |x| \geq 2$ , is

A)  $(-\infty, -1] \cup [1, \infty)$

B)  $(-\infty, -2] \cup [1, \infty)$

C)  $(-\infty, -2] \cup [2, \infty)$

D)  $(-\infty, -1]$

E)  $(-\infty, -2]$