MATHS

BOOKS - CENGAGE

LINEAR INEQUALITIES

Solved Examples And Exercises

1. Solve $|x| + |x - 2| = 2$.

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2. Solve $x^2 - 4|x| + 3 < 0$.

3. Is $|tanx + \cot x| < |tanx| + |\cot x|$ true for any x? If it is true, then find the values of x.

4. Solve $||x - 1| - 5| \leq 2$

5. For $x \in R$, find all possible values of $|x - 3| - 2$ (ii) $4 - |2x + 3|$

6. Find the possible values of $\sqrt{|x| - 2}$ (ii) $\sqrt{3 - |x - 1|}$ (iii) $\sqrt{4 - \sqrt{x^2}}$

7. Prove that $\sqrt{x^2 + 2x + 1} - \sqrt{x^2 - 2x + 1} =$ $\{-2, x < -1, 2x, -1 \le x \le 12, x > 1\}$

8. Solve $x^2 - x - 1 = 0$.

9. Solve $x^2 - x - 2 > 0$.

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10. Solve $(2x + 1)(x - 3)(x + 7) < 0$.

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11. Solve $(x - 1)(x - 2)(1 - 2x) > 0$.

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12. Solve $\dfrac{2x - 3}{3x - 5} \geq 3$

13. Solve $\dfrac{2}{x} < 3$.

14. Solve $x > \sqrt{(1-x)}$

15. Solve $\dfrac{x-2}{x+2} > \dfrac{2x-3}{4x-1}$.

16. Solve $\dfrac{2}{x^2 - x + 1} - \dfrac{1}{x + 1} - \dfrac{2x - 1}{x^3 + 1} \geq 0.$

17. Solve $\left|x^2 + x - 4\right| = \left|x^2 - 4\right| + |x|.$

18. Solve $|2x - 3| + |x - 1| = |x - 2|.$

19. Solve $|x - 3| \geq 2.$

20. If a, b, and c are nonzero rational numbers, then find the sum of all the possible values of $\dfrac{|a|}{a} + \dfrac{|b|}{b} + \dfrac{|c|}{c}$.

21. Solve $|x| = x^2 - 1$.

22. The sum of real roots of the equation $|x - 2|^2 + |x - 2| - 2 = 0$ is (A) 4 (B) 1 (C) 2 (D) -2

23. Solve $\left|x^2 + 4x + 3\right| + 2x + 5 = 0$.

24. Find the set of all x foir which

$$\frac{2x}{(2x^2 + 5x + 2)} > \frac{1}{(x + 1)}.$$

25. Solve $\dfrac{x}{x + 2} \leq \dfrac{1}{|x|}$

26. If S is the set of all real x such that $\dfrac{2x - 1}{2x^3 + 3x^2 + x}$ is positive

27. The set of all real numbers x for which $x^2 - |x + 2| + x > 0$ is $(-\infty, -2)$ b. $(-\infty, -\sqrt{2}) \cup (\sqrt{2}, \infty)$ c. $(-\infty, -1) \cup (1, \infty)$ d. $(\sqrt{2}, \infty)$

28. If x satifies $|x - 1| + |x - 2| + |x - 3| \geq 6$, then (a) $0 \leq x \leq 4$ (b). $x \leq -2$ or ≥ 4 (c). $x \leq 0$ or $x \geq 4$ (d).

None of these

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29. The largest interval for which $x^{12} - x^9 + x^4 - x + 1 > 0$

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30. Solve $||x| - 3| > 1$.

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31. If $|\sin x + \cos x| = |\sin x| + |\cos x| (\sin x, \cos x \neq 0)$, then in which quadrant does x lies?

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32. Solve $|3x - 2| = x$.

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33. Solve $1 - x = \sqrt{x^2 - 2x + 1}$.

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34. Solve $\left|x^2 - 2x\right| + |x - 4| > \left|x^2 - 3x + 4\right|.$

35. Solve the following: $|x - 2| = (x - 2),$ $|x + 2| = -x - 3,$ $\left|x^2 - x\right| = x^2 - x,$ $\left|x^2 - x - 2\right| = 2 + x - x^2$

36. Let $y = \sqrt{\dfrac{(x + 1)(x - 3)}{(x - 2)}}$. Find all the real values of x for which y takes real values.

37. Solve $|x - 1| + |x - 2| \geq 4$.

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38. Solve $|x - 2| = 1$

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39. Find the value of x for which following expressions are defined: $\dfrac{1}{\sqrt{x - |x|}}$ (ii) $\dfrac{1}{\sqrt{x + |x|}}$

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40. Find all real values of x which satisfy $x^2 - 3x + 2 > 0 \, and \, x^2 - 2x - 4 \leq 0.$

41. Find the values of a for which the equation $||x - 2| + a| = 4$ can have four distinct real solutions.

42. Solve $x + \sqrt{x} \geq \sqrt{x} - 3$.

43. Solve $(x^2 - 4)\sqrt{x^2 - 1} < 0.$

44. Solve the following : $|x| = 5$ (ii) $x^2 - |x| - 2 = 0$

45. Solve $1 \leq |x - 2| \leq 3.$

46. Solve $0 < |x - 3| \leq 5.$

47. Solve $x(x + 2)^2 (x - 1)^5 (2x - 3)(x - 3)^4 \geq 0$.

48. Solve $x(2^x - 1)(3^x - 9)^5 (x - 3) < 0$.

49. Solve $(x^2 - x - 1)(x^2 - x - 7) < -5$.

50. Let $a > 2$ be a constant. If there are just 18 positive integers satisfying the inequality $(x - a)(x - 2a)(x - a^2) < 0,$ then find the value of $a.$

51. Find the set of all possible real value of a such that the inequality $(x - (a - 1))(x - (a^2 + 2)) < 0$ holds for all $x \in (-1, 3).$

52. Find all possible values of $\dfrac{x^2 + 1}{x^2 - 2}$.

53. Solve $\sqrt{x-2} \geq -1$.

54. Solve $\sqrt{x-1} > \sqrt{3-x}$.

55. Solve $|2^x - 1| + |4 - 2^x| < 3$.

56. Solve $\left(\dfrac{1}{3}\right)^{\frac{|x+2|}{2-|x|}} > 9.$

57. Find all integers x for which $(5x - 1) < (x + 1)^2 < (7x - 3).$

58. Solve $\left| \dfrac{x - 3}{x + 1} \right| \le 1.$

59. Solve $\left| \dfrac{x+1}{x} \right| + |x+1| = \dfrac{(x+1)^2}{|x|}$.

60. Solve $\left| 1 + \dfrac{3}{x} \right| > 2$

61. Solve $|3x - 2| < 4$.

62. If

$$f(x) = x^9 - 6x^8 - 2x^7 + 12x^6 + x^4 - 7x^3 + 6x^2 + x - 3,$$

find $f(6)$.

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63. Solve $|x - 3| + |x - 2| = 1$.

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