



MATHS

BOOKS - CENGAGE MATHS (HINGLISH)

LINEAR INEQUALITIES

Solved Examples And Exercises

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

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

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

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4. Solve $||x - 1| - 2| < 5$.

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

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6. Solve $|x + 1| + |2x - 3| = 4$.

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



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8.

Prove

that

$$\sqrt{x^2 + 2x + 1} - \sqrt{x^2 - 2x + 1} = \begin{cases} -2, & x < -1 \\ 2x, & -1 \leq x \leq 1 \\ 2, & x > 1 \end{cases}$$



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9. Solve $x^2 - x - 1 < 0$.



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



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

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

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13. Solve $\frac{2x - 3}{3x - 5} \geq 3$

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14. Solve $\frac{2}{x} < 3$.

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15. Solve $x > \sqrt{1 - x}$



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16. Solve $\frac{x - 2}{x + 2} > \frac{2x - 3}{4x - 1}$.



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17. Solve $\frac{2}{x^2 - x + 1} - \frac{1}{x + 1} - \frac{2x - 1}{x^3 + 1} \geq 0$.



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18. Solve $\sqrt{(x - 5)} - \sqrt{9 - x} > 1, x \in \mathbb{Z}$.



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19. Solve $|x^2 + x - 4| = |x^2 - 4| + |x|$.



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

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

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

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23. Solve $\sqrt{x + 3 - 4\sqrt{x - 1}} + \sqrt{x + 8 - 6\sqrt{x - 1}} = 1$

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

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25. The sum of real roots of the equation $|x - 2|^2 + |x - 2| - 2 = 0$ is

(A) 4 (B) 1 (C) 2 (D) -2

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26. Solve $|x^2 + 4x + 3| + 2x + 5 = 0$.

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27. Find the set of all x for which $\frac{2x}{(2x^2 + 5x + 2)} > \frac{1}{(x + 1)}$.

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28. Solve $\frac{x}{x+2} \leq \frac{1}{|x|}$

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

A. $(-\infty, -1) \cup \left(-\frac{1}{2}, 1\right) \cup \left(\frac{1}{2}, \infty\right)$

B. $(-10, -3) \cup \left(-\frac{1}{2}, 1\right)$

C. $\left(\frac{1}{2}, 3\right) \cup (7, \infty)$

D. None of these

Answer: A

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30. 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.

$(\sqrt{2}, \infty)$



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31. If x satisfies $|x - 1| + |x - 2| + |x - 3| \geq 6$, then (a) $0 \leq x \leq 4$ (b) $x \leq -2$ or $x \geq 4$ (c) $x \leq 0$ or $x \geq 4$ (d). None of these



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



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



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

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

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

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37. Solve $|x^2 - 2x| + |x - 4| > |x^2 - 3x + 4|$.

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38. Solve the following: $|x - 2| = (x - 2)$ $|x + 2| = -x - 3$

$$|x^2 - x| = x^2 - x \quad |x^2 - x - 2| = 2 + x - x^2$$

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

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

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41. Solve the following: $|x - 2| = 1$ (ii) $2|x + 1|^2 - |x + 1| = 3$

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42. Find the value of x for which following expressions are defined:

$$\frac{1}{\sqrt{x - |x|}} \quad \text{(ii)} \quad \frac{1}{\sqrt{x + |x|}}$$

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43. Find all real values of x which satisfy

$$x^2 - 3x + 2 > 0 \text{ and } x^2 - 2x - 4 \leq 0.$$

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

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

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

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

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

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

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

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

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52. Solve $(x^2 - x - 1)^{x^2 - x - 7} < -5$.

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53. 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 .

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54. 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 $x \in (-1, 3)$.

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

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

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

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

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59. Solve $0 < |x| < 2$.

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

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

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62. Solve $\left|\frac{x - 3}{x + 1}\right| \leq 1$.



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



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64. Solve $\left| 1 + \frac{3}{x} \right| > 2$



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



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66. 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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67. Solve $|x - 3| + |x - 2| = 1$.



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