Precalculus

Topic: Inequalities

Instructions

Solve the following inequalities. Show all your steps clearly and express your answers in interval notation.

Practice Problems

1. **Solve the following linear inequalities:**
   i. $2x + 5 > 15$
   ii. $3(x - 2) + 4 \leq 10$
   iii. $\frac{x+3}{2} \geq 7$
   iv. $5x - 3 < 2x + 9$
   v. $4x - 7 > 9$
   vi. $6x + 3 \leq 15$
   vii. $x - 4 \geq 2$

2. **Solve the nonlinear inequality. Express the solution using interval notation and graph the solution:**
   i. $x^2 - 5x + 6 \geq 0$
   ii. $3x^2 + 12x + 9 < 0$
   iii. $x^2 - 4 > 0$
   iv. $2x^2 - 3x - 2 \leq 0$

v. $x^3 - x^2 - 6x > 0$

vi. $x^2 - 4 \leq 0$

vii. $\frac{x+1}{x-2} \geq 0$

viii. $x^2 + x - 6 < 0$

3. **Solve the following absolute value inequalities:**

i. $|x - 3| < 7$

ii. $2|x + 1| \geq 8$

iii. $|2x - 5| \leq 3$

iv. $|x + 4| - 2 > 6$

v. $|3x - 7| \leq 5$

vi. $|x + 2| > 4$

vii. $2|x - 6| \leq 12$

4. **Solve the following inequalities involving rational expressions:**

i. $\frac{x+2}{x-1} > 0$

ii. $\frac{2x-3}{x+4} \leq 0$

iii. $\frac{x^2-4}{x+2} \geq 0$

iv. $\frac{x-1}{x^2-4} < 0$

5. **Graph the solution sets of the following inequalities:**

i. $x^2 - 4 \leq 0$

ii. $|x - 2| > 3$

iii. $\frac{x+3}{x-1} > 0$

iv. $2x - 5 \geq 7$

v. $|x + 1| \leq 5$

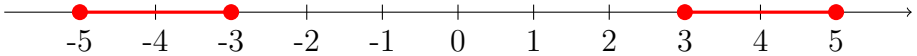
vi. $x^2 + x - 6 > 0$

vii. $\frac{2x-7}{x+3} \leq 0$

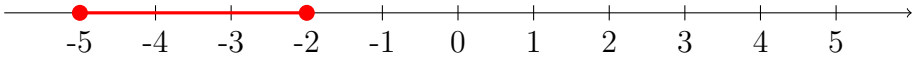
6. **Determine the inequality involving an absolute value that matches the graph:**

(a)

(b)



(c)



Multiple Choice Questions

Choose the correct answer:

1. Solve $x^2 - 9 < 0$:
   (a) $x \in (-3, 3)$
   (b) $x \in (-\infty, -3) \cup (3, \infty)$
   (c) $x \in [3, \infty)$
   (d) None of the above
2. Solve $|x - 2| \geq 5$:
   (a) $x \in [7, \infty)$
   (b) $x \in (-\infty, -3] \cup [7, \infty)$
   (c) $x \in (-\infty, -3) \cup (7, \infty)$
   (d) None of the above
3. Solve $\frac{x+4}{x-3} \leq 0$:
   (a) $x \in [-4, 3)$
   (b) $x \in (-\infty, -4] \cup (3, \infty)$
   (c) $x \in (-4, 3)$
   (d) None of the above
4. Solve $2x - 7 > 3$:
   (a) $x > 5$
   (b) $x < 5$
   (c) $x \leq 5$
   (d) None of the above
5. Solve $x^2 + 2x \leq 8$:
   (a) $x \in [-4, 2]$
   (b) $x \in (-\infty, -4) \cup (2, \infty)$
   (c) $x \in (-4, 2)$
   (d) None of the above