Polynomial & Rational Inequalities

Key Points:

- A polynomial inequality is an inequality that contains polynomial expression.

  $2x^2 + x > 15, \quad 4x^2 \leq 1 - 2x, \quad x^3 + x^2 < 4x + 4$ are example of polynomial inequalities

- A rational inequality is an inequality that contains rational expressions.

  $\frac{3}{2x} > 1, \frac{2x}{x-3} < 4, \frac{2x-3}{x-6} \geq x, \frac{1}{4} - \frac{2}{x^2} \leq \frac{3}{x}$ are examples of rational inequalities.

- Interval notation is a method to indicate the solution set to an inequality.

- Watch the videos below for the steps for solving a polynomial and rational inequality.

Polynomial and Rational Inequality Videos:

- Solving a Polynomial Inequality Algebraically: Example 1
- Solving a Polynomial Inequality Graphically: Example 2
- Solving a Polynomial Inequality Algebraically: Example 3
- Solving a Rational Inequality Algebraically: Example 4
- Solving a Rational Inequality Algebraically: Example 5
- Solving a Rational Inequality Algebraically: Example 6

Practice Exercises

Solve each inequality. Write your final answer in interval notation:

1. $\mathbf{2x^2 + 5x - 3 < 0}$

2. $\mathbf{x^3 + 2x^2 > 3x}$

3. $\mathbf{\frac{(x+1)(x-2)}{(x-1)} \geq 0}$

4. $\mathbf{\frac{x+3}{x-4} \leq 5}$

Answers:

1. $\left(-3, \frac{1}{2}\right)$
2. $(\mathbf{-3}, \mathbf{0}) \cup (\mathbf{1}, \infty)$
3. $[\mathbf{-1}, \mathbf{1}) \cup [\mathbf{2}, \infty)$
4. $(-\infty, 4) \cup \left[\frac{23}{4}, \infty\right)$