Section 2.7: Nonlinear Inequalities

In this lesson, you will learn to solve nonlinear inequalities by using number line analysis.

Solving a Quadratic Inequality

- Rewrite the inequality as an equation (with an equal sign).
- Solve as done before.
- Test an x-value between the two solutions by plugging into the original inequality.
- If you get a true statement, your solution is between the two solutions.
- If you get a false statement, your solution is outside the two solutions.

Example 1: Solve each of the following inequalities.

a. $x^2 - x > 12$

b. $x^2 + 2x - 20 \leq 4$

c. $4x^2 + 5 > x^2 + 16x$

Now we need to worry about the signs of the denominator and numerator.

Solving a Rational Inequality

- Set the denominator equal to zero and solve.
- Set the numerator equal to zero and solve.
- Plot these points on a number line (denominator is always open dot).
- Use test points between these values to determine the solution set

Example 2: Solve each of the following inequalities.

a. $\dfrac{x-6}{x+2} > 0$

b. $\dfrac{3x+6}{x-4} \leq 0$

c. $\frac{3}{x} - \frac{2}{x+2} < 0$

d. $\frac{(x-3)(x+2)}{x-5} > 0$

e. $\dfrac{3x-5}{x+3} \leq 2$