

Non-Linear Inequalities Video Lecture

Section 11.4

Course Learning Objective:

Solve certain types of quadratic, polynomial, and rational inequalities.

Weekly Learning Objectives:

- 1) Use a 2-dimensional approach to solve quadratic inequalities.**
- 2) Use a 1-dimensional approach for polynomial inequalities of degree 2 or greater and rational inequalities.**

Solving Non-Linear Inequalities

Two-Dimensional Graphical Approach:

- 1) Write the inequality in standard form (set equal to zero)
- 2) Express the quadratic expression as a function
- 3) Find the x-intercepts for the function
- 4) Draw a rough graph of f without finding the vertex
- 5) Read the solution from the graph

$$x^2 + 7x + 12 < 0$$

$$-x^2 + 3x + 2 \geq 0$$

$$x^2 - 2x + 3 > 0$$

$$x^2 - x + 5 < 0$$

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

One-Dimensional Graphical Approach:

- 1) Temporarily make the inequality symbol into an equal sign
- 2) Solve the resulting equation
- 3) Use the solution(s) to partition the x-axis
- 4) Select test points from each interval obtained in step 3 and substitute into the original inequality (use the factored form if possible)
- 5) Indicate True or False on each interval and record solution

You must use a One-Dimensional Approach when the inequality involves polynomials with degrees greater than 2 or rational inequalities.

$$x^2 + 7x + 12 < 0$$

$$x^2 - 3x \geq 2$$

$$(x^2 - 9)(x^2 - 4) > 0$$

$$x^3 + 2x^2 - 4x - 8 \geq 0$$

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

$$\frac{4}{y+2} < -2$$

$$\frac{(2x-3)^2}{x} \leq 0$$