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 <u>without</u> 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.

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

$x^2 - 3x \geq 2$

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

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

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

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

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