

Systems of Nonlinear Inequalities Video Lecture

Section 11.7

Course Learning Objectives:

Identify and articulate the significance of graphical components in a mathematical model/application.

Weekly Learning Objectives:

- 1) Graph an inequality by hand.**
- 2) Graph a system of inequalities.**

Systems of Nonlinear Inequalities

In this section we will learn how to solve systems of inequalities (in two variables) from a graphical point of view.

The solution to a **single inequality** consists of a region whose boundary is the graph of the corresponding equation. To determine which side of the graph gives the solution set to the inequality, we need only to check **test points**.

Represent the solution to each of the following inequalities in two variables:

1. $x^2 + y^2 < 36$

2. $y \leq x^2 - 3$

Solving a **system of inequalities** consists of finding the solutions that simultaneously satisfy both inequalities.

Represent the solution to each of the following systems of inequalities.

3.
$$\begin{cases} x^2 + y^2 < 25 \\ x + 2y \geq 5 \end{cases}$$

$$4. \begin{cases} x & \geq 0 \\ y & \geq 0 \\ x + y & < 10 \\ x^2 + y^2 & > 9 \end{cases}$$

The intersection points of the solution set are called vertices of the solution set. The vertices may or may not actually be part of the solution set depending on whether or not the boundaries are included. The vertices are found by finding the solution to the system of **equations**.