

# **Nonlinear Equations Video Lecture**

## **Sections 11.1 and 11.6**

### **Course Learning Objectives:**

**Solve systems of nonlinear equations.**

### **Weekly Learning Objectives:**

- 1) Solve a system of nonlinear equations using substitution.**
- 2) Solve a system of nonlinear equations using elimination.**
- 3) Solve systems of nonlinear equations by graphing.**
- 4) Solve applications involving systems of equations.**

## Solving Nonlinear Equations

Many applications in mathematics give rise to sets of equations with several variables, rather than a single equation with a single variable. A set of equations with a set of common variables is called a system of equations. You have already learned how to solve a simple system of linear equations. In this lecture we will briefly review what you have learned and learn how to solve a system of nonlinear equations.

Solve the system:

$$\begin{array}{rclcl} 2x & - & y & = & 7 \\ 4x & + & 3y & = & 19 \end{array}$$

Substitution:

Elimination:

Graphical

Solve the system:

$$\begin{array}{rclcl} 3x^2 & + & 4y & = & -4 \\ 2x^2 & + & 5y & = & -12 \end{array}$$

Solve the system:

$$\begin{array}{rclcl} 2x^2 & + & 4y & = & 13 \\ x^2 & - & y^2 & = & \frac{7}{2} \end{array}$$

Solve the system:

$$\begin{array}{rcl} x & - & y^2 = 0 \\ y & - & x^2 = 0 \end{array}$$

Solve the system:

$$\begin{array}{rcl} xy & & = 24 \\ 2x^2 & - & y = 10 \end{array}$$

Solve the system:

$$\frac{4}{x^2} + \frac{6}{y^4} = \frac{7}{2}$$
$$\frac{1}{x^2} - \frac{2}{y^4} = 0$$

Solve the system:

$$2^x + 2^y = 10$$
$$4^x + 4^y = 68$$

Solve the system:

$$\begin{aligned} y &= e^x + e^{-x} \\ y &= 5 - x^2 \end{aligned}$$

A rectangle has an area of  $180 \text{ cm}^2$  and a perimeter of  $54 \text{ cm}$ . What are its dimensions?

A rectangular piece of sheet metal with an area of  $1200 \text{ in}^2$  is to be bent into a cylindrical length of stove pipe having a volume of  $600 \text{ in}^3$ . What are the dimensions of the sheet metal?