

Section 12.6

Systems of Nonlinear Equations

OBJECTIVE 1

- ✓ **Solve a System of Nonlinear Equations Using Substitution**

1. If the system contains two variables and if the equations in the system are easy to graph, then graph them. By graphing each equation in the system, you can get an idea of how many solutions a system has and approximately where they are located.
2. Extraneous solutions can creep in when solving nonlinear systems, so it is imperative that all apparent solutions be checked.

EXAMPLE

Solving a System of Nonlinear Equations

Solve the following system of equations:

$$\begin{cases} y = 3x + 10 \\ x^2 + y^2 = 50 \end{cases}$$

OBJECTIVE 2

- 2 Solve a System of Nonlinear Equations Using Elimination

EXAMPLE**Solving a System of Nonlinear Equations**

Solve the following system of equations:

$$\begin{cases} x^2 + y^2 = 4 \\ x^2 - 2x + y^2 = 0 \end{cases}$$

EXAMPLE

Solving a System of Nonlinear Equations

Solve the following system of equations:

$$\begin{cases} x^2 + y^2 = 49 \\ y^2 - 6x = 49 \end{cases}$$

EXAMPLE

Solving a System of Nonlinear Equations

Solve the following system of equations:

$$\begin{cases} xy = 4 \\ 4x^2 + y^2 = 20 \end{cases}$$

EXAMPLE

Solving a System of Nonlinear Equations

Solve the following system of equations:

$$\begin{cases} y = \frac{4}{x-2} \\ x^2 - 4x + y^2 - 4 = 0 \end{cases}$$

EXAMPLE

Running a Long Distance Race

In a 50-mile race, the winner crosses the finish line 1 mile ahead of the second-place runner and 4 miles ahead of the third-place runner. Assuming that each runner maintains a constant speed throughout the race, by how many miles does the second-place runner beat the third-place runner?

