

# Chapter 7 Systems of Equations and Inequalities

Course Number

Instructor

Date

## Section 7.1 Linear and Nonlinear Systems of Equations

**Objective:** In this lesson you learned how to solve systems of equations by substitution and by graphing and how to use systems of equations to model and solve real-life problems.

**Important Vocabulary** Define each term or concept.

**System of equations**

**Solution of a system of equations** (in two variables)

**Solving a system of equations**

**Method of substitution**

**Graphical method**

**Points of intersection**

**Break-even point**

### I. The Method of Substitution (Pages 496–498)

To check that the ordered pair  $(-3, 4)$  is the solution of a system of equations, . . .

List the steps necessary for solving a system of equations using the method of substitution.

#### ***What you should learn***

How to use the method of substitution to solve systems of linear equations in two variables

Explain what is meant by back-substitution.

**Example 1:** Solve the system of equations using the method of substitution.

$$\begin{cases} 2x + y = 2 \\ x - 2y = -9 \end{cases}$$

## II. Nonlinear Systems of Equations (Page 499)

To solve a system of equations in which one or both of the equations are nonlinear, the method of \_\_\_\_\_ can also be used.

***What you should learn***  
How to use the method of substitution to solve systems of nonlinear equations in two variables

## III. Graphical Approach to Finding Solutions (Page 500)

When solving a system of two equations in two unknowns, what numbers of solutions to the system are possible?

***What you should learn***  
How to use a graphical approach to solve systems of equations in two or more variables

By using a graphical method, you can gain insight about the number of solutions and the locations of the solutions of a system of equations by \_\_\_\_\_

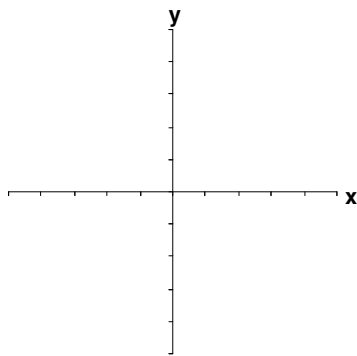
The solutions of the system correspond \_\_\_\_\_

To solve a system of equations graphically, . . .

To use a graphing utility to solve a system of equations graphically, . . .

**Example 2:** Solve the system of equations graphically.

$$\begin{cases} x^2 - y = 5 \\ -x + y = -3 \end{cases}$$



**IV. Applications of Systems of Equations** (Pages 501–502)

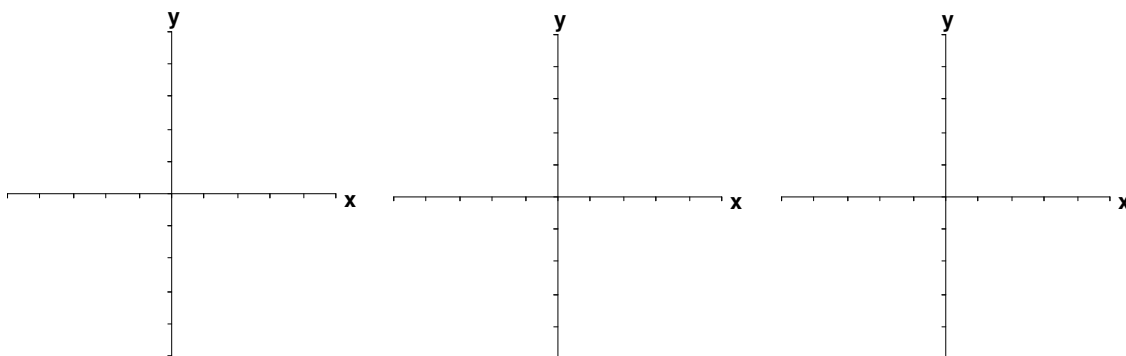
The total cost  $C$  of producing  $x$  units of a product typically has two components: \_\_\_\_\_.

In break-even analysis, the break-even point corresponds to the \_\_\_\_\_ of the cost and revenue curves.

Break-even analysis can also be approached from the point of view of profit. In this case, consider the profit function, which is \_\_\_\_\_. The break-even point occurs when profit equals \_\_\_\_\_, which is the same as saying that \_\_\_\_\_.

***What you should learn***  
 How to use systems of equations to model and solve real-life problems

**Example 3:** The cost of producing  $x$  units is  $C = 1.5x + 15,000$  and the revenue obtained by selling  $x$  units is  $R = 5x$ . How many items should be sold to break even?

**Homework Assignment**

Page(s)

Exercises