7. When solving

$$\begin{cases} x = 3y + 2 \\ 5x - 15y = 10 \end{cases}$$

by the substitution method, we obtain $10 = 10$, so the solution set is _____.
The equations in this system are called _____. If you attempt to solve such a system by graphing, you will obtain two lines that _____.

8. A company's _____ function is the money generated by selling x units of its product. The difference between this function and the company's cost function is called its _____ function.

9. A company has a graph that shows the money it generates by selling x units of its product. It also has a graph that shows its cost of producing x units of its product. The point of intersection of these graphs is called the company's _____.

EXERCISE SET 5.1

Practice Exercises

In Exercises 1–4, determine whether the given ordered pair is a solution of the system.

1. $(2, 3)$

$$\begin{cases} x + 3y = 11 \\ x - 5y = -13 \end{cases}$$

2. $(-3, 5)$

$$\begin{cases} 9x + 7y = 8 \\ 8x - 9y = -69 \end{cases}$$

3. $(2, 5)$

$$\begin{cases} 2x + 3y = 17 \\ x + 4y = 16 \end{cases}$$

4. $(8, 5)$

$$\begin{cases} 5x - 4y = 20 \\ 3y = 2x + 1 \end{cases}$$

In Exercises 5–18, solve each system by the substitution method.

5. $\begin{cases} x + y = 4 \\ y = 3x \end{cases}$

6. $\begin{cases} x + y = 6 \\ y = 2x \end{cases}$

7. $\begin{cases} x + 3y = 8 \\ y = 2x - 9 \end{cases}$

8. $\begin{cases} 2x - 3y = -13 \\ y = 2x + 7 \end{cases}$

9. $\begin{cases} x = 4y - 2 \\ x = 6y + 8 \end{cases}$

10. $\begin{cases} x = 3y + 7 \\ x = 2y - 1 \end{cases}$

11. $\begin{cases} 5x + 2y = 0 \\ x - 3y = 0 \end{cases}$

12. $\begin{cases} 4x + 3y = 0 \\ 2x - y = 0 \end{cases}$

13. $\begin{cases} 2x + 5y = -4 \\ 3x - y = 11 \end{cases}$

14. $\begin{cases} 2x + 5y = 1 \\ -x + 6y = 8 \end{cases}$

15. $\begin{cases} 2x - 3y = 8 - 2x \\ 3x + 4y = x + 3y + 14 \end{cases}$

16. $\begin{cases} 3x - 4y = x - y + 4 \\ 2x + 6y = 5y - 4 \end{cases}$

17. $\begin{cases} y = \dfrac{1}{3}x + \dfrac{2}{3} \\ y = \dfrac{5}{7}x - 2 \end{cases}$

18. $\begin{cases} y = -\dfrac{1}{2}x + 2 \\ y = \dfrac{3}{4}x + 7 \end{cases}$

In Exercises 19–30, solve each system by the addition method.

19. $\begin{cases} x + y = 1 \\ x - y = 3 \end{cases}$

20. $\begin{cases} x + y = 6 \\ x - y = -2 \end{cases}$

21. $\begin{cases} 2x + 3y = 6 \\ 2x - 3y = 6 \end{cases}$

22. $\begin{cases} 3x + 2y = 14 \\ 3x - 2y = 10 \end{cases}$

23. $\begin{cases} x + 2y = 2 \\ -4x + 3y = 25 \end{cases}$

24. $\begin{cases} 2x - 7y = 2 \\ 3x + y = -20 \end{cases}$

25. $\begin{cases} 4x + 3y = 15 \\ 2x - 5y = 1 \end{cases}$

26. $\begin{cases} 3x - 7y = 13 \\ 6x + 5y = 7 \end{cases}$

27. $\begin{cases} 3x - 4y = 11 \\ 2x + 3y = -4 \end{cases}$

28. $\begin{cases} 2x + 3y = -16 \\ 5x - 10y = 30 \end{cases}$

29. $\begin{cases} 3x = 4y + 1 \\ 3y = 1 - 4x \end{cases}$

30. $\begin{cases} 5x = 6y + 40 \\ 2y = 8 - 3x \end{cases}$

In Exercises 31–42, solve by the method of your choice. Identify systems with no solution and systems with infinitely many solutions, using set notation to express their solution sets.

31. $\begin{cases} x = 9 - 2y \\ x + 2y = 13 \end{cases}$

32. $\begin{cases} 6x + 2y = 7 \\ y = 2 - 3x \end{cases}$

33. $\begin{cases} y = 3x - 5 \\ 21x - 35 = 7y \end{cases}$

34. $\begin{cases} 9x - 3y = 12 \\ y = 3x - 4 \end{cases}$

35. $\begin{cases} 3x - 2y = -5 \\ 4x + y = 8 \end{cases}$

36. $\begin{cases} 2x + 5y = -4 \\ 3x - y = 11 \end{cases}$

37. $\begin{cases} x + 3y = 2 \\ 3x + 9y = 6 \end{cases}$

38. $\begin{cases} 4x - 2y = 2 \\ 2x - y = 1 \end{cases}$

39. $\begin{cases} \dfrac{x}{4} - \dfrac{y}{4} = -1 \\ x + 4y = -9 \end{cases}$

40. $\begin{cases} \dfrac{x}{6} - \dfrac{y}{2} = \dfrac{1}{3} \\ x + 2y = -3 \end{cases}$

41. $\begin{cases} 2x = 3y + 4 \\ 4x = 3 - 5y \end{cases}$

42. $\begin{cases} 4x = 3y + 8 \\ 2x = -14 + 5y \end{cases}$

In Exercises 43–46, let x represent one number and let y represent the other number. Use the given conditions to write a system of equations. Solve the system and find the numbers.

43. The sum of two numbers is 7. If one number is subtracted from the other, their difference is -1. Find the numbers.

44. The sum of two numbers is 2. If one number is subtracted from the other, their difference is 8. Find the numbers.

45. Three times a first number decreased by a second number is 1. The first number increased by twice the second number is 12. Find the numbers.

46. The sum of three times a first number and twice a second number is 8. If the second number is subtracted from twice the first number, the result is 3. Find the numbers.

Practice Plus

In Exercises 47–48, solve each system by the method of your choice.

47. $\begin{cases} \dfrac{x + 2}{2} - \dfrac{y + 4}{3} = 3 \\ \dfrac{x + y}{5} = \dfrac{x - y}{2} - \dfrac{5}{2} \end{cases}$

48. $\begin{cases} \dfrac{x - y}{3} = \dfrac{x + y}{2} - \dfrac{1}{2} \\ \dfrac{x + 2}{2} - 4 = \dfrac{y + 4}{3} \end{cases}$