



FIGURE 7.27

The profit function for the wheelchair business in Example 9 is

$$\begin{aligned} P(x) &= R(x) - C(x) \\ &= 600x - (500,000 + 400x) \\ &= 200x - 500,000. \end{aligned}$$

The graph of this profit function is shown in Figure 7.27. The red portion lies below the  $x$ -axis and shows a loss when fewer than 2500 wheelchairs are sold. The business is “in the red.” The black portion lies above the  $x$ -axis and shows a gain when more than 2500 wheelchairs are sold. The wheelchair business is “in the black.”

### EXERCISE SET 7.3

#### • Practice Exercises

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

- |                                 |                 |
|---------------------------------|-----------------|
| 1. (2, 3)                       | 2. (-3, 5)      |
| $x + 3y = 11$                   | $9x + 7y = 8$   |
| $x - 5y = -13$                  | $8x - 9y = -69$ |
| 3. (2, 5) <i>NOT A SOLUTION</i> | 4. (8, 5)       |
| $2x + 3y = 17$                  | $5x - 4y = 20$  |
| $x + 4y = 16$                   | $3y = 2x + 1$   |

In Exercises 5–12, solve each system by graphing. Check the coordinates of the intersection point in both equations.

- |                               |                  |
|-------------------------------|------------------|
| 5. $x + y = 6$                | 6. $x + y = 2$   |
| $x - y = 2$                   | $x - y = 4$      |
| 7. $2x - 3y = 6$              | 8. $4x + y = 4$  |
| $4x + 3y = 12$                | $3x - y = 3$     |
| 9. $y = x + 5$ <i>(-1, 4)</i> | 10. $y = x + 1$  |
| $y = -x + 3$                  | $y = 3x - 1$     |
| 11. $y = -x - 1$              | 12. $y = 3x - 4$ |
| $4x - 3y = 24$                | $2x + y = 1$     |

In Exercises 13–24, solve each system by the substitution method. Be sure to check all proposed solutions.

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|--------------------------------|---------------------|
| 13. $x + y = 4$                | 14. $x + y = 6$     |
| $y = 3x$                       | $y = 2x$            |
| 15. $x + 3y = 8$ <i>(5, 1)</i> | 16. $2x - 3y = -13$ |
| $y = 2x - 9$                   | $y = 2x + 7$        |
| 17. $x + 3y = 5$               | 18. $y = 2x + 7$    |
| $4x + 5y = 13$                 | $2x - y = -15$      |
| 19. $2x - y = -5$              | 20. $2x + 3y = 11$  |
| $x + 5y = 14$                  | $x - 4y = 0$        |
| 21. $2x - y = 3$               | 22. $-x + 3y = 10$  |
| $5x - 2y = 10$                 | $2x + 8y = -6$      |

*(4, 5)*

- |                  |                     |
|------------------|---------------------|
| 23. $x + 8y = 6$ | 24. $-4x + y = -11$ |
| $2x + 4y = -3$   | $2x - 3y = 5$       |

In Exercises 25–36, solve each system by the addition method. Be sure to check all proposed solutions.

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|------------------------------------|---------------------|
| 25. $x + y = 1$                    | 26. $x + y = 6$     |
| $x - y = 3$                        | $x - y = -2$        |
| 27. $2x + 3y = 6$ <i>(3, 0)</i>    | 28. $3x + 2y = 14$  |
| $2x - 3y = 6$                      | $3x - 2y = 10$      |
| 29. $x + 2y = 2$                   | 30. $2x - 7y = 2$   |
| $-4x + 3y = 25$                    | $3x + y = -20$      |
| 31. $4x + 3y = 15$                 | 32. $3x - 7y = 13$  |
| $2x - 5y = 1$                      | $6x + 5y = 7$       |
| 33. $3x - 4y = 11$ <i>(+1, -2)</i> | 34. $2x + 3y = -16$ |
| $2x + 3y = -4$                     | $5x - 10y = 30$     |
| 35. $2x = 3y - 4$                  | 36. $5x = 4y - 8$   |
| $-6x + 12y = 6$                    | $3x + 7y = 14$      |

In Exercises 37–44, 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.

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|--|--------------------|
| 37. $x = 9 - 2y$                       | 38. $6x + 2y = 7$  |
| $x + 2y = 13$                          | $y = 2 - 3x$       |
| 39. $y = 3x - 5$ <i>MANY SOLUTIONS</i> | 40. $9x - 3y = 12$ |
| $21x - 35 = 7y$ <i>ex. (1, -2)</i>     | $y = 3x - 4$       |
| 41. $3x - 2y = -5$                     | 42. $2x + 5y = -4$ |
| $4x + y = 8$                           | $3x - y = 11$      |
| 43. $x + 3y = 2$ <i>MANY</i>           | 44. $4x - 2y = 2$  |
| $3x + 9y = 6$ <i>ex. (0, 2/3)</i>      | $2x - y = 1$       |