

4.3 EXERCISES

Exercises 5–20, use the method of this section to solve the given linear programming problem.

5. Maximize $P = x + 2y$
 subject to $2x + 5y \leq 20$
 $x - 5y \leq -5$
 $x \geq 0, y \geq 0$

6. Maximize $P = 2x + 3y$
 subject to $x + 2y \leq 8$
 $x - y \leq -2$
 $x \geq 0, y \geq 0$

7. Minimize $C = -2x + y$
 subject to $x + 2y \leq 6$
 $3x + 2y \leq 12$
 $x \geq 0, y \geq 0$

8. Minimize $C = -2x + 3y$
 subject to $x + 3y \leq 60$
 $2x + y \geq 45$
 $x \leq 40$
 $x \geq 0, y \geq 0$

9. Maximize $P = x + 4y$
 subject to $x + 3y \leq 6$
 $-2x + 3y \leq -6$
 $x \geq 0, y \geq 0$

10. Maximize $P = 5x + y$
 subject to $2x + y \leq 8$
 $-x + y \geq 2$
 $x \geq 0, y \geq 0$

11. Maximize $P = x + 2y$
 subject to $2x + 3y \leq 12$
 $-x + 3y = 3$
 $x \geq 0, y \geq 0$

12. Minimize $C = x + 2y$
 subject to $4x + 7y \leq 70$
 $2x + y = 20$
 $x \geq 0, y \geq 0$

13. Maximize $P = 5x + 4y + 2z$
 subject to $x + 2y + 3z \leq 24$
 $x - y + z \geq 6$
 $x \geq 0, y \geq 0, z \geq 0$

14. Maximize $P = x - 2y + z$
 subject to $2x + 3y + 2z \leq 12$
 $x + 2y - 3z \leq 6$
 $x \geq 0, y \geq 0, z \geq 0$

15. Minimize $C = x - 2y + z$
 subject to $x - 2y + 3z \leq 10$
 $2x + y - 2z \leq 15$
 $2x + y + 3z \leq 20$
 $x \geq 0, y \geq 0, z \geq 0$

16. Minimize $C = 2x - 3y + 4z$
 subject to $-x + 2y - z \leq 8$
 $x - 2y + 2z \leq 10$
 $2x + 4y - 3z \leq 12$
 $x \geq 0, y \geq 0, z \geq 0$

17. Maximize $P = 2x + y + z$
 subject to $x + 2y + 3z \leq 28$
 $2x + 3y - z \leq 6$
 $x - 2y + z \geq 4$
 $x \geq 0, y \geq 0, z \geq 0$

18. Minimize $C = 2x - y + 3z$
 subject to $2x + y + z \geq 2$
 $x + 3y + z \geq 6$
 $2x + y + 2z \leq 12$
 $x \geq 0, y \geq 0, z \geq 0$

19. Maximize $P = x + 2y + 3z$
 subject to $x + 2y + z \leq 20$
 $3x + y \leq 30$
 $2x + y + z = 10$
 $x \geq 0, y \geq 0, z \geq 0$

20. Minimize $C = 3x + 2y + z$
 subject to $x + 2y + z \leq 20$
 $3x + y \leq 30$
 $2x + y + z = 10$
 $x \geq 0, y \geq 0, z \geq 0$

Solutions

5. $x = 5, y = 2$, and $P = 9$

7. $x = 4, y = 0$, and $C = -8$

9. $x = 4, y = \frac{2}{3}$, and $P = \frac{20}{3}$

11. $x = 3, y = 2$, and $P = 7$

13. $x = 24, y = 0, z = 0$, and $P = 120$

15. $x = 0, y = 17, z = 1$, and $C = -33$

17. $x = \frac{46}{7}, y = 0, z = \frac{50}{7}$, and $P = \frac{142}{7}$

19. $x = 0, y = 0, z = 10$, and $P = 30$