


## PART IV – LINEAR PROGRAMMING

### Exercise 1.

In Problems 3–8, find the maximum and minimum value of the given objective function of a linear programming problem. The figure illustrates the graph of the feasible points.

3.  $z = x + y$

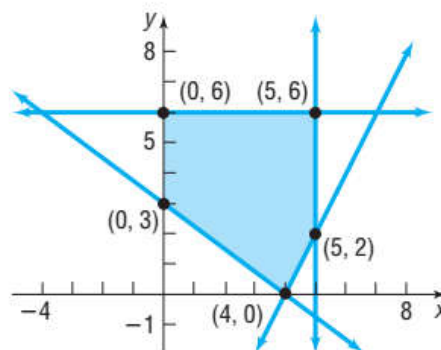
4.  $z = 2x + 3y$

 5.  $z = x + 10y$

6.  $z = 10x + y$

7.  $z = 5x + 7y$

8.  $z = 7x + 5y$




### Exercise 2.

In Problems 9–18, solve each linear programming problem

9. Maximize  $z = 2x + y$  subject to  $x \geq 0$ ,  $y \geq 0$ ,  $x + y \leq 6$ ,  $x + y \geq 1$

10. Maximize  $z = x + 3y$  subject to  $x \geq 0$ ,  $y \geq 0$ ,  $x + y \geq 3$ ,  $x \leq 5$ ,  $y \leq 7$

 11. Minimize  $z = 2x + 5y$  subject to  $x \geq 0$ ,  $y \geq 0$ ,  $x + y \geq 2$ ,  $x \leq 5$ ,  $y \leq 3$

12. Minimize  $z = 3x + 4y$  subject to  $x \geq 0$ ,  $y \geq 0$ ,  $2x + 3y \geq 6$ ,  $x + y \leq 8$

13. Maximize  $z = 3x + 5y$  subject to  $x \geq 0$ ,  $y \geq 0$ ,  $x + y \geq 2$ ,  $2x + 3y \leq 12$ ,  $3x + 2y \leq 12$

14. Maximize  $z = 5x + 3y$  subject to  $x \geq 0$ ,  $y \geq 0$ ,  $x + y \geq 2$ ,  $x + y \leq 8$ ,  $2x + y \leq 10$

15. Minimize  $z = 5x + 4y$  subject to  $x \geq 0$ ,  $y \geq 0$ ,  $x + y \geq 2$ ,  $2x + 3y \leq 12$ ,  $3x + y \leq 12$

16. Minimize  $z = 2x + 3y$  subject to  $x \geq 0$ ,  $y \geq 0$ ,  $x + y \geq 3$ ,  $x + y \leq 9$ ,  $x + 3y \geq 6$

17. Maximize  $z = 5x + 2y$  subject to  $x \geq 0$ ,  $y \geq 0$ ,  $x + y \leq 10$ ,  $2x + y \geq 10$ ,  $x + 2y \geq 10$

18. Maximize  $z = 2x + 4y$  subject to  $x \geq 0$ ,  $y \geq 0$ ,  $2x + y \geq 4$ ,  $x + y \leq 9$

### Exercise 3.

Spring Break: The student activities department of a community college plans to rent buses and vans for a springbreak trip. Each bus has 40 regular seats and 1 handicapped seat; each van has 8 regular seats and 3 handicapped seats. The rental cost is \$350 for each van and \$975 for each bus. If 320 regular and 36 handicapped seats are required for the trip, how many vehicles of each type should be rented to minimize cost?

### Exercise 4.

Financial Planning A retired couple has up to \$50,000 to place in fixed-income securities. Their financial adviser suggests two securities to them: one is an AAA bond that yields 8% per annum; the other is a certificate of deposit (CD) that yields 4%. After careful consideration of the alternatives, the couple decides to place at most \$20,000 in the AAA bond and at least \$15,000 in the CD. They also instruct the financial adviser to place at least as much in the CD as in the AAA bond. How should the financial adviser proceed to maximize the return on their investment?

## **HOMEWORKS**

**Exercise 1: 4, 6, 8**

**Exercise 2: 10, 12, 14, 16, 18**

**Exercise 3**

**Exercise 4.**