

Exerciții

I. De găsit prin metoda grafică și prin metoda tabelelor simplex soluțiile optime ale PROBLEMA DE PROGRAMARE LINIARĂ.

1. $f = 7x_1 + 6x_2 \rightarrow \max;$

$$2x_1 + 5x_2 \geq 10,$$

$$5x_1 + 2x_2 \geq 10,$$

$$2x_2 \geq 10,$$

$$x_1, x_2 \geq 0.$$

2. $f = 3x_1 - 2x_2 \rightarrow \max;$

$$2x_1 + x_2 \leq 11,$$

$$-3x_1 + 2x_2 \leq 10,$$

$$3x_1 + 2x_2 \geq 20,$$

$$x_1, x_2 \geq 0.$$

3. $f = 5x_1 - 3x_2 \rightarrow \min;$

$$3x_1 + 2x_2 \geq 6,$$

$$2x_1 - 3x_2 \geq -6,$$

$$x_1 - x_2 \leq 4,$$

$$4x_1 + 7x_2 \leq 28,$$

$$x_1, x_2 \geq 0.$$

4. $f = 2x_1 + x_2 \rightarrow \max;$

$$x_1 - 2x_2 \geq 4,$$

$$5x_1 + 2x_2 \leq 27,$$

$$4x_1 - 3x_2 \leq 12,$$

$$7x_1 + 4x_2 \leq 28,$$

$$x_1, x_2 \geq 0.$$

5. $f = 2x_1 + 3x_2 \rightarrow \max;$

$$3x_1 - 2x_2 \geq -6,$$

$$x_1 + x_2 \geq 3,$$

$$x_2 \leq 5,$$

$$x_1, x_2 \geq 0.$$

6. $f = 3x_1 + 3x_2 \rightarrow \max;$

$$x_1 - 4x_2 \leq 4,$$

$$3x_1 + 2x_2 \leq 6,$$

$$x_1 + 2x_2 \geq 2,$$

$$x_1, x_2 \geq 0.$$

7. $f = x_1 + 2x_2 \rightarrow \max;$

$$3x_1 + 2x_2 \leq 9,$$

$$3x_1 + 4x_2 \leq 27,$$

$$2x_1 + x_2 \leq 14,$$

$$x_1, x_2 \geq 0.$$

8. $f = 2x_1 - 4x_2 \rightarrow \max;$

$$8x_1 - 5x_2 \leq 16,$$

$$x_1 + 3x_2 \leq 2,$$

$$2x_1 + 7x_2 \geq 9,$$

$$x_1, x_2 \geq 0.$$

9. $f = 7x_1 - 2x_2 \rightarrow \min;$

$$5x_1 - 2x_2 \leq 3,$$

$$x_1 - x_2 \geq 1,$$

$$x_1 + x_2 \leq 4, x_1, x_2 \geq 0.$$

10. $f = 2x_1 - x_2 \rightarrow \max;$

$$x_1 + x_2 \geq -3,$$

$$x_1 + 7x_2 \leq 42,$$

$$x_1 + x_2 \geq 4, x_1, x_2 \geq 0.$$

$$11. f = x_1 + 2x_2 \rightarrow \max;$$

$$5x_1 - 2x_2 \leq 4,$$

$$x_1 - 2x_2 \geq -4,$$

$$x_1 + x_2 \geq 4,$$

$$x_1, x_2 \geq 0.$$

$$12. f = x_1 + 3x_2 \rightarrow \max;$$

$$-x_1 + x_2 \leq 3,$$

$$4x_1 - 3x_2 \leq 20,$$

$$x_1 + x_2 \geq 4,$$

$$x_1, x_2 \geq 0.$$

$$13. f = 7x_1 + x_2 \rightarrow \max;$$

$$x_1 + x_2 \leq 14,$$

$$3x_1 - 5x_2 \leq 15,$$

$$5x_1 + 3x_2 \geq 21,$$

$$x_1, x_2 \geq 0.$$

$$14. f = x_1 + 2x_2 \rightarrow \max;$$

$$5x_1 - 2x_2 \leq 4,$$

$$x_1 - 2x_2 \leq 4,$$

$$x_1 + x_2 \geq 3,$$

$$x_1, x_2 \geq 0.$$

$$15. f = x_1 - x_2 \rightarrow \max;$$

$$-x_1 + x_2 \geq 8,$$

$$8x_1 + 5x_2 \leq 80,$$

$$x_1 - 2x_2 \leq 2,$$

$$x_1 + 4x_2 \geq 4,$$

$$x_1, x_2 \geq 0.$$

$$16. f = 2x_1 + x_2 \rightarrow \max;$$

$$x_1 - x_2 \geq 4,$$

$$x_1 + x_2 \geq 10,$$

$$4x_1 - x_2 \leq 12,$$

$$7x_1 + x_2 \leq 7,$$

$$x_1, x_2 \geq 0.$$

$$17. f = x_1 + x_2 \rightarrow \min;$$

$$3x_1 + x_2 \geq 8,$$

$$x_1 + 2x_2 \geq 6,$$

$$x_1 - x_2 \leq 3,$$

$$x_1, x_2 \geq 0.$$

$$18. f = x_1 + x_2 \rightarrow \max;$$

$$x_1 - 2x_2 \leq 7,$$

$$-x_1 + x_2 \leq 5,$$

$$x_1 - x_2 \leq 6,$$

$$x_1 \geq 0, x_2 \geq 0.$$

$$19. f = x_1 + x_2 \rightarrow \max;$$

$$x_1 + x_2 \geq 1,$$

$$5x_1 + x_2 \leq 0,$$

$$x_1 + 5x_2 \geq 0,$$

$$x_1 + x_2 \leq 6;$$

$$x_1, x_2 \geq 0.$$

$$20. f = x_1 + 2x_2 \rightarrow \max;$$

$$x_1 + x_2 \leq 4,$$

$$3x_1 + x_2 \geq 4,$$

$$x_1 + 5x_2 \geq 4,$$

$$0 \leq x_1 \leq 3,$$

$$0 \leq x_2 \leq 3.$$

$$21. f = 2x_1 - x_2 \rightarrow \max;$$

$$x_1 + x_2 \leq -3,$$

$$6x_1 + 7x_2 \leq 42,$$

$$3x_1 - 2x_2 \leq 6,$$

$$x_1 \geq 0, x_2 \geq 0.$$

$$22. f = -3x_1 + x_2 \rightarrow \min;$$

$$x_1 + 2x_2 \geq 10,$$

$$3x_1 + x_2 \geq 15,$$

$$x_1 \leq 8,$$

$$x_1 \geq 0, x_2 \geq 0.$$

$$23. f = -2x_1 + x_2 \rightarrow \min;$$

$$2x_1 + x_2 \leq 8,$$

$$x_1 + 3x_2 \geq 6,$$

$$3x_1 + x_2 \geq 3,$$

$$x_1 \geq 0, x_2 \geq 0.$$

$$24. f = 2x_1 + 2x_2 \rightarrow \max;$$

$$3x_1 - 2x_2 \geq -6,$$

$$x_1 + x_2 \geq 3$$

$$0 \leq x_1 \leq 9;$$

$$0 \leq x_2 \leq 6.$$

$$25. f = 2x_1 - 4x_2 \rightarrow \max;$$

$$8x_1 - 5x_2 \leq 16,$$

$$x_1 + 3x_2 \geq 2,$$

$$2x_1 + 7x_2 \leq 9,$$

$$x_1, x_2 \geq 0.$$

$$26. f = -3x_1 + 6x_2 \rightarrow \min;$$

$$5x_1 - 2x_2 \leq 4,$$

$$x_1 - 2x_2 \geq -4,$$

$$x_1 + x_2 \geq 4,$$

$$x_1, x_2 \geq 0.$$

$$27. f = 3x_1 + 3x_2 \rightarrow \max;$$

$$x_1 + x_2 \leq 8,$$

$$3x_1 + 7x_2 \geq 21$$

$$x_1 + 2x_2 \geq 6,$$

$$0 \leq x_1 \leq 1;$$

$$0 \leq x_2 \leq 1.$$

$$28. f = 2x_1 + 2x_2 \rightarrow \max;$$

$$3x_1 - 2x_2 \geq -6,$$

$$x_1 + x_2 \geq 3,$$

$$x_1 \leq 3,$$

$$x_2 \leq 5;$$

$$x_1, x_2 \geq 0.$$

1.3. Dualitatea în programarea liniară

1.3.1. Algoritmul simplex dual

Alegerea algoritmului simplex la rezolvarea problemei duale ne conduce la un algoritm nou de rezolvare a problemelor de programare liniară, numit *algoritmul simplex dual*. Algoritmul simplex dual construiește o succesiune de soluții de bază ale