**Самостоятельная работа 1 по исследованию операций и методам оптимизации.**

# Тема линейное программирование

**Задача 1.** Решить ЗЛП геометрическим способом

Варианты:

1. Z(X)=x1-x2→min

x1≥0, x2≥0

2. Z(X)=x1-x2→min

x1≥0, x2≥0

3. Z(X)=3x1-x2→min

x1≥0, x2≥0

4. Z(X)= 3x1+6x2 →max

x1≥0, x2≥0

5. Z(X)=4x1+3x2→min

x2≥0

6. Z(X)=x1+4x2→min

x1≥0, x2≥0

7. Z(X)=2x1+5x2→min

x1≥0, x2≥0

8. Z(X)=2x1+4x2→max

x1≥0, x2≥0

9. Z(X)=2x1+3x2→max

x1≥0

10. Z(X)=3x1+2x2→max

x1≥0, x2≥0

**Задача 2.** Решить ЗЛП симплекс методом

Варианты:

1. Z(X)=2x1+x2-x3-2x4→min

2x1+x2-3x3+x4=6

x1+x2+2x3-x4=7

xj≥0, j=1,2,3,4.

2. Z(X)=2x1+x2-4x3+3x4→max

-2x1+ 3x3+x4=-2

3x1+x2-5x3+2x4=7

xj≥0, j=1,2,3,4.

3. Z(X)=4x1+4x2-3x3+2x4→min

2x1+13x2-4x3+3x4=19

3x1+7x2-x3+2x4=16

xj≥0, j=1,2,3,4.

4. Z(X)=4x1+13x2+3x3+6x4→min

-5x1+3x2-x3+2x4=-1

9x1-4x2+2x3-3x4=6

xj≥0, j=1,2,3,4.

5. Z(X)= 11x2+x3+4x4→min

4x1-5x2+x3-x4=1

11 x1-11x2+3x3-2x4=11

xj≥0, j=1,2,3,4.

6. Z(X)=9x1+2x2+4x3-8x4→max

4x1+3x2+2x3-7x4=12

2x1+2x2+x3-4x4=4

xj≥0, j=1,2,3,4.

7. Z(X)=12x1+8x2+5x3+4x4→min

-6x1+x2-x3+2x4=-2

11x1-x2+2x3-3x4=7

xj≥0, j=1,2,3,4.

8. Z(X)=3x1+2x2+5x3+4x4→min

8x1-7x2+3x3-2x4=4

x1+4x2+2x3+3x4=20

xj≥0, j=1,2,3,4.

9. Z(X)=2x1+6x2+x3+x4→max

-4x1+5x2+2x3-x4=-2

5x1-8x2-3x3+x4=-1

xj≥0, j=1,2,3,4.

10. Z(X)=x1-2x2-x3+3x4→max

-4x1+2x2-x3+x4=2

-6x1+6x2-x3+2x4=10

xj≥0, j=1,2,3,4.

**Задача 3.** **Для задачи 2** построить двойственную к ней. Решить двойственную задачу. Объяснить экономический смысл двойственных переменных.

**Задача 4.** Решить транспортную задачу

Варианты :

1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ai\bj | 200 | 200 | 300 | 100 | 400 |
| 300 | 3 | 4 | 3 | 1 | 5 |
| 200 | 2 | 3 | 5 | 6 | 8 |
| 100 | 1 | 2 | 3 | 3 | 4 |
| 200 | 4 | 5 | 7 | 9 | 9 |
| 300 | 5 | 6 | 8 | 4 | 7 |

2.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ai\bj | 20 | 20 | 40 | 10 | 30 |
| 20 | 1 | 1 | 3 | 4 | 5 |
| 10 | 2 | 3 | 4 | 2 | 6 |
| 20 | 1 | 1 | 4 | 7 | 8 |
| 30 | 5 | 6 | 3 | 4 | 7 |
| 10 | 4 | 5 | 7 | 6 | 4 |

3.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ai\bj | 200 | 300 | 400 | 200 | 300 |
| 200 | 1 | 3 | 4 | 2 | 5 |
| 200 | 1 | 2 | 4 | 1 | 7 |
| 300 | 3 | 4 | 5 | 9 | 9 |
| 300 | 6 | 3 | 7 | 6 | 8 |
| 100 | 5 | 6 | 7 | 3 | 4 |

4.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ai\bj | 300 | 150 | 300 | 150 | 250 |
| 150 | 2 | 1 | 3 | 1 | 5 |
| 250 | 8 | 3 | 7 | 4 | 6 |
| 250 | 6 | 4 | 9 | 3 | 4 |
| 150 | 5 | 2 | 4 | 2 | 3 |
| 150 | 4 | 6 | 2 | 3 | 4 |

5.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ai\bj | 10 | 10 | 25 | 25 | 30 |
| 10 | 1 | 5 | 7 | 9 | 3 |
| 20 | 4 | 6 | 4 | 7 | 13 |
| 10 | 1 | 5 | 3 | 4 | 9 |
| 30 | 2 | 4 | 2 | 10 | 3 |
| 10 | 3 | 2 | 5 | 6 | 4 |

6.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ai\bj | 100 | 200 | 200 | 300 | 200 |
| 100 | 4 | 3 | 5 | 2 | 3 |
| 200 | 7 | 1 | 2 | 3 | 1 |
| 300 | 9 | 2 | 4 | 5 | 6 |
| 100 | 1 | 3 | 6 | 4 | 10 |
| 200 | 5 | 8 | 15 | 6 | 15 |

7.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ai\bj | 200 | 400 | 100 | 200 | 100 |
| 200 | 1 | 7 | 12 | 2 | 5 |
| 100 | 2 | 3 | 8 | 4 | 7 |
| 200 | 3 | 5 | 4 | 6 | 9 |
| 400 | 4 | 4 | 3 | 8 | 2 |
| 400 | 5 | 3 | 7 | 10 | 1 |

8.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ai\bj | 5 | 10 | 15 | 15 | 15 |
| 10 | 2 | 5 | 5 | 6 | 7 |
| 5 | 4 | 3 | 4 | 4 | 3 |
| 5 | 5 | 2 | 3 | 6 | 2 |
| 10 | 3 | 6 | 5 | 7 | 8 |
| 15 | 1 | 9 | 7 | 6 | 4 |

9.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ai\bj | 10 | 30 | 30 | 30 | 40 |
| 10 | 3 | 1 | 3 | 4 | 3 |
| 30 | 5 | 1 | 2 | 2 | 6 |
| 60 | 2 | 3 | 4 | 1 | 1 |
| 10 | 6 | 2 | 5 | 3 | 2 |
| 60 | 3 | 7 | 4 | 4 | 1 |

10.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ai\bj | 50 | 50 | 100 | 100 | 50 |
| 50 | 3 | 4 | 6 | 5 | 13 |
| 50 | 6 | 3 | 7 | 6 | 10 |
| 100 | 10 | 5 | 2 | 2 | 6 |
| 150 | 9 | 4 | 4 | 9 | 5 |
| 100 | 3 | 2 | 4 | 2 | 3 |