**ЛАБОРАТОРНАЯ РАБОТА №4**

Транспортная задача. Методы нахождения начального решения транспортной задачи.

Автор работы

студент 2 курса

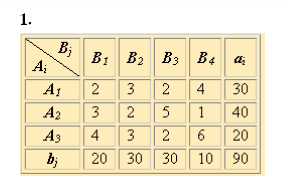
группы ИВТ(1) подгруппы 2

Ефимова В.С.

**Задача 1**

**Постановка задачи:**

Составить опорные планы различными методами, сравнить значения суммарной стоимости перевозок по каждому плану.



**Решение задачи:**

Метод северо-западного угла:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **ai** |
| **A1** |  |  |  |  | 30 |
| **A2** |  |  |  |  | 40 |
| **A3** |  |  |  |  | 20 |
| **bj** | 20 | 30 | 30 | 10 |  |

**Z = 20\*2+10\*3+20\*2+20\*5+10\*2+10\*6 = 40+30+40+100+20+60 = 290**

Метод минимальной стоимости:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **ai (зап)** |
| **A1** | 20 |  | 10 |  | 30 |
| **A2** |  | 30 |  | 10 | 40 |
| **A3** |  |  | 20 |  | 20 |
| **bj(пот)** | 20 | 30 | 30 | 10 |  |

**Z = 20\*2 + 10\*2 + 30\*2 + 10\*1 + 20\*2 = 40+20+60+10+40 = 170**

Метод аппроксимации Фогеля:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **ai** | **△cii** |
| **А1** |  |  |  |  | 30 | 1 |
| **А2** |  |  |  | 10 | 30 | 1 |
| **А3** |  |  |  |  | 20 | 1 |
| **Bj** | 20 | 30 | 30 | 0 | - |  |
| **△ cii** | 1 | 1 | 0 | 2 |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **ai** | **△cii** |
| **А1** | 20 |  |  |  | 30 | 1 |
| **А2** |  |  |  | 10 | 30 | 1 |
| **А3** |  |  |  |  | 20 | 1 |
| **Bj** | 0 | 30 | 30 | 0 | - |  |
| **△ cii** | - | 1 | 0 | - |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **ai** | **△cii** |
| **А1** | 20 |  |  |  | 10 | 1 |
| **А2** |  | 30 |  | 10 | 0 | - |
| **А3** |  |  |  |  | 20 | 1 |
| **Bj** | 0 | 0 | 30 | 0 | - |  |
| **△ cii** | - | - | 0 | - |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **ai** | **△cii** |
| **А1** | 20 |  | 10 |  | 0 | - |
| **А2** |  | 30 |  | 10 | 0 | - |
| **А3** |  |  |  |  | 20 | 1 |
| **Bj** | 0 | 0 | 20 | 0 | - |  |
| **△ cii** | - | - | 0 | - |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **ai** | **△cii** |
| **А1** | 20 |  | 10 |  | 0 | - |
| **А2** |  | 30 |  | 10 | 0 | - |
| **А3** |  |  | 20 |  | 0 | - |
| **Bj** | 0 | 0 | 0 | 0 | - |  |
| **△ cii** | - | - | - | - |  |  |

**Z = 20\*2 + 30\*2 + 10\*2 + 10\*1 + 20\*2 = 40 + 60 + 20 + 10 + 40 = 170**

Метод двойного предпочтения:

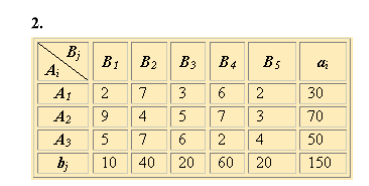
|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **ai (зап)** |
| **A1** | 20 VV |  | 10 VV |  | 30 |
| **A2** |  | 30 V |  | 10 VV | 40 |
| **A3** |  |  | 20 VV |  | 20 |
| **bj(пот)** | 20 | 30 | 30 | 10 |  |

**Z = 20\*2 + 10\*2 + 30\*2 + 10\*1 + 20\*2 = 40+20+60+10+40 = 170**

**Задача 2**

**Постановка задачи:**

Составить опорные планы различными методами, сравнить значения суммарной стоимости перевозок по каждому плану.



**Решение задачи:**

Метод северо-западного угла:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** |
| **A1** | 10 | 20 |  |  |  | 30 |
| **A2** |  | 20 | 20 | 30 |  | 70 |
| **A3** |  |  |  | 30 | 20 | 50 |
| **bj (пот)** | 10 | 40 | 20 | 60 | 20 |  |

**Z = 10\*2+20\*7+20\*4+20\*5+30\*7+30\*2+20\*4 = 20+140+80+100+210+60+80 = 690**

Метод минимальной стоимости:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** |
| **A1** | 10 |  |  |  | 20 | 30 |
| **A2** |  | 40 | 20 | 10 |  | 70 |
| **A3** |  |  |  | 50 |  | 50 |
| **bj (пот)** | 10 | 40 | 20 | 60 | 20 |  |

**Z = 10\*2+20\*2+40\*4+20\*5+10\*7+50\*2 = 20+40+160+100+70+100 = 490**

Метод аппроксимации Фогеля:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** |  |  |  |  |  | 30 | 1 |
| **A2** |  |  |  |  |  | 70 | 1 |
| **A3** |  |  |  | 50 |  | 0 | - |
| **bj (пот)** | 10 | 40 | 20 | 10 | 20 |  |  |
| **△cii** | 3 | 3 | 2 | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** | 10 |  |  |  |  | 20 | 1 |
| **A2** |  |  |  |  |  | 70 | 1 |
| **A3** |  |  |  | 50 |  | 0 | - |
| **bj (пот)** | 0 | 40 | 20 | 10 | 20 |  |  |
| **△cii** | - | 3 | 2 | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** | 10 |  |  |  |  | 20 | 1 |
| **A2** |  | 40 |  |  |  | 30 | 1 |
| **A3** |  |  |  | 50 |  | 0 | - |
| **bj (пот)** | 0 | 0 | 20 | 10 | 20 |  |  |
| **△cii** | - | - | 2 | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** | 10 |  | 20 |  |  | 0 | - |
| **A2** |  | 40 |  |  |  | 30 | 1 |
| **A3** |  |  |  | 50 |  | 0 | - |
| **bj (пот)** | 0 | 0 | 0 | 10 | 20 |  |  |
| **△cii** | - | - | - | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** | 10 |  | 20 |  |  | 0 | - |
| **A2** |  | 40 |  |  | 20 | 10 | 1 |
| **A3** |  |  |  | 50 |  | 0 | - |
| **bj (пот)** | 0 | 0 | 0 | 10 | 0 |  |  |
| **△cii** | - | - | - | 1 | - |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** | 10 |  | 20 |  |  | 0 | - |
| **A2** |  | 40 |  | 10 | 20 | 0 | - |
| **A3** |  |  |  | 50 |  | 0 | - |
| **bj (пот)** | 0 | 0 | 0 | 0 | 0 |  |  |
| **△cii** | - | - | - | - | - |  |  |

**Z = 10\*2 + 20\*3 + 40\*4 + 10\*7 + 20\*3 + 50\*2 = 20 + 60 + 160 + 70 + 60 + 100 = 470**

Метод двойного предпочтения:

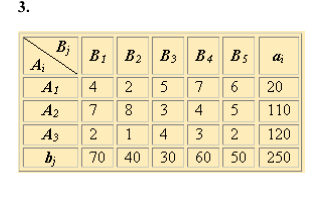
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** |
| **A1** | 10 VV |  | V |  | 20 VV | 30 |
| **A2** |  | 40 V | 20 | 10 | V | 70 |
| **A3** |  |  |  | 50 VV |  | 50 |
| **bj (пот)** | 10 | 40 | 20 | 60 | 20 |  |

**Z = 10\*2+20\*2+40\*4+20\*5+10\*7+50\*2 = 20+40+160+100+70+100 = 490**

**Задача 3**

**Постановка задачи:**

Составить опорные планы различными методами, сравнить значения суммарной стоимости перевозок по каждому плану.



**Решение задачи:**

Метод северо-западного угла:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** |
| **A1** | 20 |  |  |  |  | 20 |
| **A2** | 50 | 40 | 20 |  |  | 110 |
| **A3** |  |  | 10 | 60 | 50 | 120 |
| **bj (пот)** | 70 | 40 | 30 | 60 | 50 |  |

**Z = 20\*4+50\*7+40\*8+20\*3+10\*4+60\*3+50\*2 = 80+350+320+60+40+180+100 = 1130**

Метод минимальной стоимости:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** |
| **A1** |  |  |  |  | 20 | 20 |
| **A2** |  |  | 30 | 60 | 20 | 110 |
| **A3** | 70 | 40 |  |  | 10 | 120 |
| **bj (пот)** | 70 | 40 | 30 | 60 | 50 |  |

**Z = 20\*6 + 30\*3 + 60\*4 + 20\*5 + 70\*2 + 40\*1 + 10\*2 = 120 + 90 + 240 + 100 + 140 + 40 + 20 = 750**

Метод аппроксимации Фогеля:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** |  |  |  |  |  | 20 | 2 |
| **A2** |  |  |  |  |  | 110 | 1 |
| **A3** |  |  |  |  |  | 120 | 1 |
| **bj (пот)** | 70 | 40 | 30 | 60 | 50 |  |  |
| **△cii** | 2 | 1 | 1 | 1 | 3 |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** |  |  |  |  |  | 20 | 2 |
| **A2** |  |  |  |  |  | 110 | 1 |
| **A3** |  |  |  |  | 50 | 70 | 1 |
| **bj (пот)** | 70 | 40 | 30 | 60 | 0 |  |  |
| **△cii** | 2 | 1 | 1 | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** |  | 20 |  |  |  | 0 | 2 |
| **A2** |  |  |  |  |  | 110 | 1 |
| **A3** |  |  |  |  | 50 | 70 | 1 |
| **bj (пот)** | 70 | 20 | 30 | 60 | 0 |  |  |
| **△cii** | 2 | 1 | 1 | 1 | 1 |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** |  | 20 |  |  |  | 0 | - |
| **A2** |  |  |  |  |  | 110 | 1 |
| **A3** |  | 20 |  |  | 50 | 50 | 1 |
| **bj (пот)** | 70 | 0 | 30 | 60 | 0 |  |  |
| **△cii** | 2 | 7 | 1 | 1 | - |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** |  | 20 |  |  |  | 0 | - |
| **A2** |  |  |  |  |  | 110 | 1 |
| **A3** | 50 | 20 |  |  | 50 | 0 | 1 |
| **bj (пот)** | 20 | 0 | 30 | 60 | 0 |  |  |
| **△cii** | 2 | - | 1 | 1 | - |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** |  | 20 |  |  |  | 0 | - |
| **A2** | 20 |  |  |  |  | 90 | 1 |
| **A3** | 50 | 20 |  |  | 50 | 0 | 1 |
| **bj (пот)** | 0 | 0 | 30 | 60 | 0 |  |  |
| **△cii** | 3 | - | 1 | 1 | - |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** |  | 20 |  |  |  | 0 | - |
| **A2** | 20 |  | 30 |  |  | 60 | 1 |
| **A3** | 50 | 20 |  |  | 50 | 0 | - |
| **bj (пот)** | 0 | 0 | 0 | 60 | 0 |  |  |
| **△cii** | 3 | - | 1 | 1 | - |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** | **△cii** |
| **A1** |  | 20 |  |  |  | 0 | - |
| **A2** | 20 |  | 30 | 60 |  | 0 | - |
| **A3** | 50 | 20 |  |  | 50 | 0 | - |
| **bj (пот)** | 0 | 0 | 0 | 0 | 0 |  |  |
| **△cii** | 3 | - | - | - | - |  |  |

**Z = 20\*2 + 20\*7 + 30\*3 + 60\*4 + 50\*2 + 20\*1 = 40 + 140 + 90 + 240 + 100 = 610**

Метод двойного предпочтения:

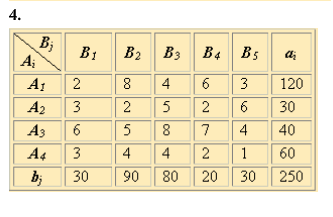
|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai(зап)** |
| **A1** |  | V |  |  | 20 | 20 |
| **A2** |  |  | 30 VV | 60 | 20 | 110 |
| **A3** | 70 V | 40 VV |  | V | 10 V | 120 |
| **bj (пот)** | 70 | 40 | 30 | 60 | 50 |  |

**Z = 20\*6+30\*3+60\*4+20\*5+70\*2+40\*1+10\*2 = 120+90+240+100+140+40+20 = 750**

**Задача 4**

**Постановка задачи:**

Составить опорные планы различными методами, сравнить значения суммарной стоимости перевозок по каждому плану.



**Решение задачи:**

Метод северо-западного угла:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai (зап)** |
| **A1** | 30 | 90 |  |  |  | **120** |
| **A2** |  |  | 30 |  |  | **30** |
| **A3** |  |  | 40 |  |  | **40** |
| **A4** |  |  | 10 | 20 | 30 | **60** |
| **bj(пот)** | **30** | **90** | **80** | **20** | **30** |  |

**Z = 30\*2+90\*8+30\*5+40\*8+10\*4+20\*2+30\*1 = 60+720+150+320+40+40+30 = 1360**

Метод минимальной стоимости:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai (зап)** |
| **A1** | 30 | 10 | 80 |  |  | **120** |
| **A2** |  | 30 |  |  |  | **30** |
| **A3** |  | 40 |  |  |  | **40** |
| **A4** |  | 10 |  | 20 | 30 | **60** |
| **bj(пот)** | **30** | **90** | **80** | **20** | **30** |  |

**Z = 30\*2 + 10\*8 + 80\*4 + 30\*2 + 40\*5 + 10\*4 + 20\*2 + 30\*1 = 60+80+320+60+200+40+40+30 = 830**

Метод аппроксимации Фогеля:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai (зап)** | **△cii** |
| **A1** |  |  |  |  |  | **120** | **1** |
| **A2** |  | 30 |  |  |  | **30** | **-** |
| **A3** |  |  |  |  |  | **40** | **1** |
| **A4** |  |  |  |  |  | **60** | **1** |
| **bj(пот)** | **30** | **60** | **80** | **20** | **30** |  |  |
| **△cii** | **1** | **1** | **0** | **0** | **2** |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai (зап)** | **△cii** |
| **A1** |  |  |  |  |  | **120** | **1** |
| **A2** |  | 30 |  |  |  | **30** | **-** |
| **A3** |  |  |  |  |  | **40** | **1** |
| **A4** |  |  |  |  | 30 | **30** | **1** |
| **bj(пот)** | **30** | **60** | **80** | **20** | **0** |  |  |
| **△cii** | **1** | **1** | **0** | **0** | **-** |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai (зап)** | **△cii** |
| **A1** | 30 |  |  |  |  | **120** | **1** |
| **A2** |  | 30 |  |  |  | **30** | **-** |
| **A3** |  |  |  |  |  | **40** | **1** |
| **A4** |  |  |  |  | 30 | **30** | **1** |
| **bj(пот)** | **0** | **60** | **80** | **20** | **0** |  |  |
| **△cii** | **-** | **1** | **0** | **0** | **-** |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai (зап)** | **△cii** |
| **A1** | 30 |  |  |  |  | **120** | **1** |
| **A2** |  | 30 |  |  |  | **0** | **-** |
| **A3** |  |  |  |  |  | **40** | **1** |
| **A4** |  | 30 |  |  | 30 | **0** | **-** |
| **bj(пот)** | **0** | **30** | **80** | **20** | **0** |  |  |
| **△cii** | **-** | **3** | **0** | **0** | **-** |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai (зап)** | **△cii** |
| **A1** | 30 |  |  |  |  | **120** | **1** |
| **A2** |  | 30 |  |  |  | **0** | **-** |
| **A3** |  | 30 |  |  |  | **10** | **1** |
| **A4** |  | 30 |  |  | 30 | **0** | **-** |
| **bj(пот)** | **0** | **0** | **80** | **20** | **0** |  |  |
| **△cii** | **-** | **-** | **0** | **0** | **-** |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai (зап)** | **△cii** |
| **A1** | 30 |  | 80 |  |  | **10** | **1** |
| **A2** |  | 30 |  |  |  | **0** | **-** |
| **A3** |  | 30 |  |  |  | **10** | **1** |
| **A4** |  | 30 |  |  | 30 | **0** | **-** |
| **bj(пот)** | **0** | **0** | **0** | **20** | **0** |  |  |
| **△cii** | **-** | **-** | **-** | **0** | **-** |  |  |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai (зап)** | **△cii** |
| **A1** | 30 |  | 80 | 10 |  | **0** | **-** |
| **A2** |  | 30 |  |  |  | **0** | **-** |
| **A3** |  | 30 |  | 10 |  | **0** | **-** |
| **A4** |  | 30 |  |  | 30 | **0** | **-** |
| **bj(пот)** | **0** | **0** | **0** | **0** | **0** |  |  |
| **△cii** | **-** | **-** | **-** | **-** | **-** |  |  |

**Z = 30\*2 + 80\*4 + 10\*6 + 30\*2 + 30\*5 + 10\*7 + 30\*4 + 30\*1 = 60 + 320 + 60 + 60 + 150 + 70 + 120 + 30 = 870**

Метод двойного предпочтения:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **B1** | **B2** | **B3** | **B4** | **B5** | **ai (зап)** |
| **A1** | 30 VV | 10 | 80 V |  |  | **120** |
| **A2** |  | 30 VV |  | VV |  | **30** |
| **A3** |  | 40 |  |  | V | **40** |
| **A4** |  | 10 | V | 20 V | 30 VV | **60** |
| **bj(пот)** | **30** | **90** | **80** | **20** | **30** |  |

**Z = 30\*2 + 10\*8 + 80\*4 + 30\*2 + 40\*5 + 10\*4 + 20\*2 + 30\*1 = 60+80+320+60+200+40+40+30 = 830**