**Домашняя работа №2**

**Болорболд Аригуун, Р3111**

**Вариант 121**

Алгоритм Дейкстра

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | e1 | e2 | e3 | e4 | e5 | e6 | e7 | e8 | e9 | e10 | e11 | e12 |
| e1 | 0 |  | 3 | 5 |  | 3 |  | 1 | 4 |  |  | 2 |
| e2 |  | 0 | 5 | 3 |  | 5 |  |  |  |  | 5 | 5 |
| e3 | 3 | 5 | 0 |  |  |  |  |  |  |  | 5 |  |
| e4 | 5 | 3 |  | 0 |  | 4 |  |  |  | 2 |  |  |
| e5 |  |  |  |  | 0 |  |  | 5 | 4 | 3 |  | 4 |
| e6 | 3 | 5 |  | 4 |  | 0 |  | 1 |  |  |  |  |
| e7 |  |  |  |  |  |  | 0 | 1 | 2 | 2 |  |  |
| e8 | 1 |  |  |  | 5 | 1 | 1 | 0 |  | 1 | 2 |  |
| e9 | 4 |  |  |  | 4 |  | 2 |  | 0 | 4 | 2 |  |
| e10 |  |  |  | 2 | 3 |  | 2 | 1 | 4 | 0 |  |  |
| e11 |  | 5 | 5 |  |  |  |  | 2 | 2 |  | 0 |  |
| e12 | 2 | 5 |  |  | 4 |  |  |  |  |  |  | 0 |

|  |  |
| --- | --- |
| e1 | 0+ |
| e2 | *∞* |
| e3 | *∞* |
| e4 | *∞* |
| e5 | *∞* |
| e6 | *∞* |
| e7 | *∞* |
| e8 | *∞* |
| e9 | *∞* |
| e10 | *∞* |
| e11 | *∞* |
| e12 | *∞* |

1. Гр = {e1, e5, e6, e7, e10, e11}

I(e5) = min[*∞*, 1 + 5] = 6,

I(e6) = min[2*,* 1 + 1] = 2,

I(e7) = min[*∞*, 1 + 1] = 2,

I(e10) = min[4, 1 + 1] = 2,

I(e11) = min[4, 1 + 2] = 3,

min[I(ei)] = I(e6) = 2+

min[I(ei)] = I(e10) = 2+

1. I(e1) = 0+, l(ei) = ∞, для всех i ≠ 1.

Гр = {e3, e4, e6, e8, e9, e12}

I(e3) = min[∞, 0 + 3] = 3,

I(e4) = min[∞, 0 + 5] = 5,

I(e6) = min[∞, 0 + 3] = 3,

I(e8) = min[∞, 0 + 1] = 1,

I(e9) = min[∞, 0 + 4] = 4,

I(e12) = min[∞, 0 + 2] = 2,

min[I(ei)] = I(e8) = 1+

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | | 1 | | 2 | |
| e1 | | 0+ | |  | |
| e2 | | *∞* | | *∞* | |
| e3 | | *∞* | | 3 | |
| e4 | | *∞* | | 5 | |
| e5 | | *∞* | | *∞* | |
| e6 | | *∞* | | 2 | |
| e7 | | *∞* | | *∞* | |
| e8 | | *∞* | | 1+ | |
| e9 | | *∞* | | 4 | |
| e10 | | *∞* | | *∞* | |
| e11 | | *∞* | | *∞* | |
| e12 | | *∞* | | 2 | |
|  | 1 | | 2 | | 3 | |
| e1 | 0+ | |  | |  | |
| e2 | *∞* | | *∞* | | *∞* | |
| e3 | *∞* | | 3 | | 3 | |
| e4 | *∞* | | 5 | | 5 | |
| e5 | *∞* | | *∞* | | 6 | |
| e6 | *∞* | | 2 | | 2+ | |
| e7 | *∞* | | *∞* | | 2 | |
| e8 | *∞* | | 1+ | |  | |
| e9 | *∞* | | 4 | | 4 | |
| e10 | *∞* | | *∞* | | 2 | |
| e11 | *∞* | | *∞* | | 3 | |
| e12 | *∞* | | 2 | | 2 | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 |
| e1 | 0+ |  |  |  |
| e2 | *∞* | *∞* | *∞* | 7 |
| e3 | *∞* | 3 | 3 | 3 |
| e4 | *∞* | 5 | 5 | 5 |
| e5 | *∞* | *∞* | 6 | 6 |
| e6 | *∞* | 2 | 2+ |  |
| e7 | *∞* | *∞* | 2 | 2+ |
| e8 | *∞* | 1+ |  |  |
| e9 | *∞* | 4 | 4 | 4 |
| e10 | *∞* | *∞* | 2 | 2 |
| e11 | *∞* | *∞* | 3 | *3* |
| e12 | *∞* | 2 | 2 | 2 |

4. Гр = {e8, e9, e10}

1. Гр = {e1, e2, e4, e8}

I(e2) = min[*∞,* 2 + 5] = 7,

I(e4) = min[5, 2 + 4] = 5,

min[I(ei)] = I(e7) = 2+

I(e9) = min[4, 2 + 2] = 4,

I(e10) = min[2, 2 + 2] = 2,

min[I(ei)] = I(e10) = 2+

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 |
| e1 | 0+ |  |  |  |  |
| e2 | *∞* | *∞* | *∞* | 7 | 7 |
| e3 | *∞* | 3 | 3 | 3 | 3 |
| e4 | *∞* | 5 | 5 | 5 | 5 |
| e5 | *∞* | *∞* | 6 | 6 | 6 |
| e6 | *∞* | 2 | 2+ |  |  |
| e7 | *∞* | *∞* | 2 | 2+ |  |
| e8 | *∞* | 1+ |  |  |  |
| e9 | *∞* | 4 | 4 | 4 | 4 |
| e10 | *∞* | *∞* | 2 | 2 | 2+ |
| e11 | *∞* | *∞* | 3 | 3 | 3 |
| e12 | *∞* | 2 | 2 | 2 | 2 |

6. Гр = {e1, e2, e5}

I(e2) = min[7, 2 + 5] = 7,

I(e5) = min[5, 2 + 4] = 5

min[I(ei)] = I(e3) = 3+

5. Гр = {e4, e5, e7, e8, e9}

I(e4) = min[5, 2 + 2] = 4,

I(e5) = min[6, 2 + 3] = 5,

I(e9) = min[4, 2 + 4] = 4,

min[I(ei)] = I(e12) = 2+

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 |
| e1 | 0+ |  |  |  |  |  |
| e2 | ∞ | ∞ | ∞ | 7 | 7 | 7 |
| e3 | ∞ | 3 | 3 | 3 | 3 | 3 |
| e4 | ∞ | 5 | 5 | 5 | 5 | 4 |
| e5 | ∞ | ∞ | 6 | 6 | 6 | 5 |
| e6 | ∞ | 2 | 2+ |  |  |  |
| e7 | ∞ | ∞ | 2 | 2+ |  |  |
| e8 | ∞ | 1+ |  |  |  |  |
| e9 | ∞ | 4 | 4 | 4 | 4 | 4 |
| e10 | ∞ | ∞ | 2 | 2 | 2+ |  |
| e11 | ∞ | ∞ | 3 | 3 | 3 | 3 |
| e12 | ∞ | 2 | 2 | 2 | 2 | 2+ |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 5. Гр = {e4, e5, e7, e8, e9}  I(e5) = min[6, 2 + 3] = 5,  I(e7) = min[2, 2 + 2] = 2,  I(e9) = min[4, 2 + 4] = 4,  min[I(ei)] = I(e7) = 2+ | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| e1 | 0+ |  |  |  |  |  |  |
| e2 | *∞* | *∞* | *∞* | 7 | 7 | 7 | 7 |
| e3 | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |
| e4 | *∞* | 5 | 5 | 5 | 5 | 4 | 4 |
| e5 | *∞* | *∞* | 6 | 6 | 6 | 5 | 5 |
| e6 | *∞* | 2 | 2+ |  |  |  |  |
| e7 | *∞* | *∞* | 2 | 2+ |  |  |  |
| e8 | *∞* | 1+ |  |  |  |  |  |
| e9 | *∞* | 4 | 4 | 4 | 4 | 4 | 4 |
| e10 | *∞* | *∞* | 2 | 2 | 2+ |  |  |
| e11 | *∞* | *∞* | 3 | 3 | 3 | 3 | 3 |
| e12 | *∞* | 2 | 2 | 2 | 2 | 2+ |  |

7. Гр = {e1, e2, e11}

I(e2) = min[7, 3 + 5] = 7,

I(e11) = min[3, 3 + 5] = 3,

min[I(ei)] = I(e11) = 3+

8. Гр = {e2, e3, e8, e9}

I(e2) = min[7, 3 + 5] = 5,

I(e9) = min[4, 3 + 2] = 4,

min[I(ei)] = I(e9) = 4+

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| e1 | 0+ |  |  |  |  |  |  |  |
| e2 | *∞* | *∞* | *∞* | 7 | 7 | 7 | 7 | 7 |
| e3 | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |  |
| e4 | *∞* | 5 | 5 | 5 | 5 | 4 | 4 | 4 |
| e5 | *∞* | *∞* | 6 | 6 | 6 | 5 | 5 | 5 |
| e6 | *∞* | 2 | 2+ |  |  |  |  |  |
| e7 | *∞* | *∞* | 2 | 2 | 2 | 2+ |  |  |
| e8 | *∞* | 1+ |  |  |  |  |  |  |
| e9 | *∞* | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| e10 | *∞* | *∞* | 2 | 2 | 2+ |  |  |  |
| e11 | *∞* | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |
| e12 | *∞* | 2 | 2 | 2 | 2 | 2+ |  |  |

9. Гр = {e1, e5, e10, e11}

I(e5) = min[5, 4 + 4] = 5,

Min[I(ei)] = I(e4) = 4+

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| e1 | 0+ |  |  |  |  |  |  |  |  |
| e2 | *∞* | *∞* | *∞* | 7 | 7 | 7 | 7 | 7 | 7 |
| e3 | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |  |  |
| e4 | *∞* | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 |
| e5 | *∞* | *∞* | 6 | 6 | 6 | 5 | 5 | 5 | 5 |
| e6 | *∞* | 2 | 2+ |  |  |  |  |  |  |
| e7 | *∞* | *∞* | 2 | 2 | 2 | 2+ |  |  |  |
| e8 | *∞* | 1+ |  |  |  |  |  |  |  |
| e9 | *∞* | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4+ |
| e10 | *∞* | *∞* | 2 | 2 | 2+ |  |  |  |  |
| e11 | *∞* | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |  |
| e12 | *∞* | 2 | 2 | 2 | 2 | 2+ |  |  |  |

10. Гр = {e1, e2, e6, e10}

I(e2) = min[7, 5 + 3] = 7,

Min[I(ei)] = I(e5) = 5+

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| e1 | 0+ |  |  |  |  |  |  |  |  |  |
| e2 | *∞* | *∞* | *∞* | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| e3 | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |  |  |  |
| e4 | *∞* | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4+ |
| e5 | *∞* | *∞* | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 |
| e6 | *∞* | 2 | 2+ |  |  |  |  |  |  |  |
| e7 | *∞* | *∞* | 2 | 2 | 2 | 2+ |  |  |  |  |
| e8 | *∞* | 1+ |  |  |  |  |  |  |  |  |
| e9 | *∞* | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4+ |  |
| e10 | *∞* | *∞* | 2 | 2 | 2+ |  |  |  |  |  |
| e11 | *∞* | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |  |  |
| e12 | *∞* | 2 | 2 | 2 | 2 | 2+ |  |  |  |  |

11. Гр = {e8, e9, e10, e12}

Min[I(ei)] = I(e2) = 7+

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| e1 | 0+ |  |  |  |  |  |  |  |  |  |  |
| e2 | *∞* | *∞* | *∞* | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 |
| e3 | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |  |  |  |  |
| e4 | *∞* | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4+ |  |
| e5 | *∞* | *∞* | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5+ |
| e6 | *∞* | 2 | 2+ |  |  |  |  |  |  |  |  |
| e7 | *∞* | *∞* | 2 | 2 | 2 | 2+ |  |  |  |  |  |
| e8 | *∞* | 1+ |  |  |  |  |  |  |  |  |  |
| e9 | *∞* | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4+ |  |  |
| e10 | *∞* | *∞* | 2 | 2 | 2+ |  |  |  |  |  |  |
| e11 | *∞* | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |  |  |  |
| e12 | *∞* | 2 | 2 | 2 | 2 | 2+ |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| e1 | 0+ |  |  |  |  |  |  |  |  |  |  |  |
| e2 | *∞* | *∞* | *∞* | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7 | 7+ |
| e3 | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |  |  |  |  |  |
| e4 | *∞* | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4+ |  |  |
| e5 | *∞* | *∞* | 6 | 6 | 6 | 5 | 5 | 5 | 5 | 5 | 5+ |  |
| e6 | *∞* | 2 | 2+ |  |  |  |  |  |  |  |  |  |
| e7 | *∞* | *∞* | 2 | 2 | 2 | 2+ |  |  |  |  |  |  |
| e8 | *∞* | 1+ |  |  |  |  |  |  |  |  |  |  |
| e9 | *∞* | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4+ |  |  |  |
| e10 | *∞* | *∞* | 2 | 2 | 2+ |  |  |  |  |  |  |  |
| e11 | *∞* | *∞* | 3 | 3 | 3 | 3 | 3 | 3+ |  |  |  |  |
| e12 | *∞* | 2 | 2 | 2 | 2 | 2+ |  |  |  |  |  |  |

Найденные кратчайшие пути:

*e1* → *e1* = *0*, *e1* → *e5* *= 5, e1* → *e9 = 4,*

*e1* → *e2 = 7, e1* → *e6 = 2, e1* → *e10 = 2,*

*e1* → *e3 = 3, e1* → *e7 = 2, e1* → *e11 = 3,*

*e1* → *e4* *= 4, e1* → *e8 = 1, e1* → *e12 = 2*