Домашняя работа №2. Вариант 49

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Группа: P3106

Исходная таблица:

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

Найти кратчайшие пути от начальной вершины e1 ко всем остальным вершинам

1. l(e1) = 0+; l(ei) = inf, для всех i != 1, p = e1

|  |  |
| --- | --- |
|  | 1 |
| e1 | 0+ |
| e2 | inf |
| e3 | inf |
| e4 | inf |
| e5 | inf |
| e6 | inf |
| e7 | inf |
| e8 | inf |
| e9 | inf |
| e10 | inf |
| e11 | inf |
| e12 | inf |

1. Гe1 = {e2, e4, e5, e7, e9, e11, e12} – все вершины временные

l(e2) = min(inf,0+4) = 4

l(e4) = min(inf,0+3) = 3

l(e5) = min(inf,0+3) = 3

l(e7) = min(inf,0+4) = 4

l(e9) = min(inf,0+1) = 1

l(e11) = min(inf,0+3) = 3

l(e12) = min(inf,0+4) = 4

1. l(ei+) = l(e9) = 1+

p = e9

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

1. Гe9 = {e1, e2, e3, e4, e6, e10} – временные {e2, e3, e4, e6, e10}

l(e2) = min(4,1+2) = 3

l(e3) = min(inf,1+1) = 2

l(e4) = min(3,1+1) = 2

l(e6) = min(inf,1+5) = 6

l(e10) = min(inf,1+4) = 5

1. l(ei+) = l(e3) = 2+

p = e3

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

1. Гe3 = {e2, e4, e7, e9, e12} – временные {e2, e4, e7, e12}

l(2) = min(3,2+1) = 3

l(4) = min(2,2+1 )= 2

l(7) = min(4,2+2) = 4

l(12 )= min(4,2+4) = 4

1. l(ei+) = l(e4) = 2+

p = e4

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

1. Гe4 = {e1, e3, e5, e6, e9, e10, e11, e12} – временные {e5, e6, e10, e11, e12}

l(5) = min(3,2+2) = 3

l(6) = min(6,2+1) = 3

l(10) = min(5,2+5) = 5

l(11) = min(3,2+3) = 3

l(12) = min(4,2+3) = 4

1. l(ei+) = l(e2) = 3+

p = e2

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

1. Гe2 = {e1, e3, e9, e10, e11} – временные {e10, e11}

l(10) = min(5,3+3) = 5

l(11) = min(3,3+2) = 3

1. l(ei+) = l(e5) = 3+

p = 5

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

1. Гe5 = {e1, e4, e6, e7, e8, e12} – временные {e6, e7, e8, e12}

l(6) = min(3,3+3) = 3

l(7) = min(4,3+4) = 4

l(8) = min(inf,3+3) = 6

l(12) = min(4,3+3) = 4

1. l(ei+) = l(e6) = 3+

p = 6

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

1. Гe6 = {e4, e5, e7, e9, e11, e12} – временные {e7, e11, e12}

l(7) = min(4,3+3) = 4

l(11) = min(3,3+2) = 3

l(12) = min(4,3+2) = 4

1. l(ei+) = l(e11) = 3+

p = 11

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

1. Гe11 = {e1, e2, e4, e6, e7} – временные {e7}

l(7) = min(4,3+4) = 4

1. l(ei+) = l(e7) = 4+

p = 7

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

1. Гe7 = {e1, e3, e5, e6, e8, e11, e12} – временные {e8, e12}

l(8) = min(6,4+3) = 6

l(12) = min(4,4+1) = 4

1. l(ei+) = l(e12) = 4+

p = 12

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

1. Гe12 = {e1, e3, e4, e5, e6, e7} – временных нет
2. l(ei+) = l(e10) = 5+

p = 10

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

1. Гe10 = {e2, e4, e9} – временных нет
2. l(ei+) = l(e8) = 6+

p = 8

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

Ответ:

l(e1) = 0+

l(e2) = 3+

l(e3) = 2+

l(e4) = 2+

l(e5) = 3+

l(e6) = 3+

l(e7) = 4+

l(e8) = 6+

l(e9) = 1+

l(e10) = 5+

l(e11) = 3+

l(e12) = 4+