Xuecong Fan

Assignment 9 written part

1.

0: 1->4

1: 2->4

3: 4

4: 5

5:

6: 3->4

2.

0:

1: 0

2:1

3:6

4: 0->1->3->6

5:2->4

6:

3.

a.

Step 1:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| stack |  |  |  |  |  |  |  |
| list |  |  |  |  |  |  |  |

Step2:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| stack | 0 | 6 |  |  |  |  |  |
| list |  |  |  |  |  |  |  |

Step3:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| stack | 0 |  |  |  |  |  |  |
| list | 6 |  |  |  |  |  |  |

Step4:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| stack | 0 | 3 |  |  |  |  |  |
| list | 6 |  |  |  |  |  |  |

Step5:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| stack | 0 |  |  |  |  |  |  |
| list | 6 | 3 |  |  |  |  |  |

Step6:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| stack | 1 |  |  |  |  |  |  |
| list | 6 | 3 | 0 |  |  |  |  |

Step7:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| stack | 2 | 4 |  |  |  |  |  |
| list | 6 | 3 | 0 | 1 |  |  |  |

Step8:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| stack | 2 |  |  |  |  |  |  |
| list | 6 | 3 | 0 | 1 | 4 |  |  |

Step9:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| stack | 5 |  |  |  |  |  |  |
| list | 6 | 3 | 0 | 1 | 4 | 2 |  |

Step10:

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| stack |  |  |  |  |  |  |  |
| list | 6 | 3 | 0 | 1 | 4 | 2 | 5 |

b.

6->3->0->1->4->2->5

4.

():distance

0: 1(5) -> 4(10)

1: 2(2) -> 3(9) ->4(3) ->5(8)

2: 0(7) -> 3(6) ->5(4)

3:2(4) ->4(8) ->5(3)

4:1(2) ->3(1)

5:3(6)

5.

a.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | ∞ | ∞ | 10 | ∞ |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 14 | 8 | 13 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 13 | 8 | 11 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 9 | 8 | 11 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 9 | 8 | 12 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 9 | 8 | 12 |  |  |  |  |

b. and c.

0 to 1:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | ∞ | ∞ | 10 | ∞ |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 14 | 8 | 13 |  |  |  |  |

The shortest path from vertex 0 is: 0->1

The shortest distance from vertex 0 is: 5

0 to 2:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | ∞ | ∞ | 10 | ∞ |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 14 | 8 | 13 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 13 | 8 | 11 |  |  |  |  |

The shortest path form vertex 0 is 0->1->2

The shortest distance from vertex 0 is: 7

0 to 3:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | ∞ | ∞ | 10 | ∞ |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 14 | 8 | 13 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 13 | 8 | 11 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 9 | 8 | 11 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 9 | 8 | 12 |  |  |  |  |

Because 9<13<14, therefore:

The shortest path form vertex 0 is 0->1->4 -> 3

The shortest distance from vertex 0 is: 9

0 to 4:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | ∞ | ∞ | 10 | ∞ |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 14 | 8 | 13 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 13 | 8 | 11 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 9 | 8 | 11 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 9 | 8 | 12 |  |  |  |  |

Because 8<10, therefore:

The shortest path form vertex 0 is 0->1->4

The shortest distance from vertex 0 is: 8

0 to 5:

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 |  |  |  |  |  |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | ∞ | ∞ | 10 | ∞ |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 14 | 8 | 13 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 13 | 8 | 11 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 9 | 8 | 11 |  |  |  |  |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 |  |  |  |  |
| 0 | 5 | 7 | 9 | 8 | 12 |  |  |  |  |

Because 11 < 12, therefore:

The shortest path form vertex 0 is 0->1->2->5

The shortest distance from vertex 0 is: 11