Nathan Tipton Homework 9

1. Adjacency list of DAG

0: 1→4

1: 2→4

2: 5

3: 4

4: 5

5:

6:3→4

1. In-degrees for each vertex

0: 0

1: 1

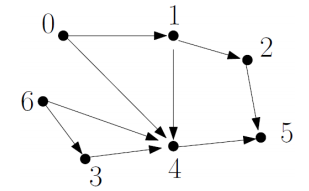
2: 1

3: 1

4: 4

5: 2

6: 0

1. Topological Sort Algorithm
   1. Stack

**0**

**6**

**0**

**6**

**3**

**0**

**3**

**0**

**1**

**2**

**1**

**4**

**4**

**2**

**2**

**5**

**5**

In-Degree

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **0** | **1** | **2** | **3** | **4** | **5** | **6** |
| In-Degree (1) | 0 | 1 | 1 | 1 | 4 | 2 | 0 |
| In-Degree (2) | 0 | 1 | 1 | 0 | 3 | 2 | 0 |
| In-Degree (3) | 0 | 1 | 1 | 0 | 2 | 2 | 0 |
| In-Degree (4) | 0 | 0 | 1 | 0 | 1 | 2 | 0 |
| In-Degree (5) | 0 | 0 | 0 | 0 | 0 | 2 | 0 |
| In-Degree (6) | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| In-Degree(7) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

1. Adjacency list of Weighted Directed graph

0:1→4

1:2→3→4→5

2:0→3→5

3:2→4→5

4:1→3

5:3

1. Dijkstra’s shortest path algorithm

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **0** | **1** | **2** | **3** | **4** | **5** |
| Iteration 1 | Dist | 0 | ∞ | ∞ | ∞ | ∞ | ∞ |
| Prev | ∞ | ∞ | ∞ | ∞ | ∞ | ∞ |
| 0 |  | **0** | **1** | **2** | **3** | **4** | **5** |
| Iteration 2 | Dist | 0 | 5 | ∞ | ∞ | 10 | ∞ |
| Prev | ∞ | 0 | ∞ | ∞ | 0 | ∞ |
| 1 |  | **0** | **1** | **2** | **3** | **4** | **5** |
| Iteration 3 | Dist | 0 | 5 | 7 | 14 | 8 | 13 |
| Prev | ∞ | 0 | 1 | 1 | 1 | 1 |
| 2 |  | **0** | **1** | **2** | **3** | **4** | **5** |
| Iteration 4 | Dist | 0 | 5 | 7 | 13 | 8 | 11 |
| Prev | ∞ | 0 | 1 | 2 | 1 | 2 |
| 3 |  | **0** | **1** | **2** | **3** | **4** | **5** |
| Iteration 5 | Dist | 0 | 5 | 7 | 13 | 8 | 11 |
| Prev | ∞ | 0 | 1 | 2 | 1 | 2 |
| 4 |  | **0** | **1** | **2** | **3** | **4** | **5** |
| Iteration 6 | Dist | 0 | 5 | 7 | 9 | 8 | 11 |
| Prev | ∞ | 0 | 1 | 4 | 1 | 2 |
| 5 |  | **0** | **1** | **2** | **3** | **4** | **5** |
| Iteration 7 | Dist | 0 | 5 | 7 | 9 | 8 | 11 |
| Prev | ∞ | 0 | 1 | 4 | 1 | 2 |

b. Shortest path from vertex 0 to each other vertex.

0:0

1:0→1

2:0→1→2

3:0→1→4→3

4:0→1→4

5:0→1→2→5

c. Shortest Path Distance from vertex 0 to each other vertex

0:0

1:5

2:7

3:9

4:8

5:11