# Algorithm Analysis

## Extra HW

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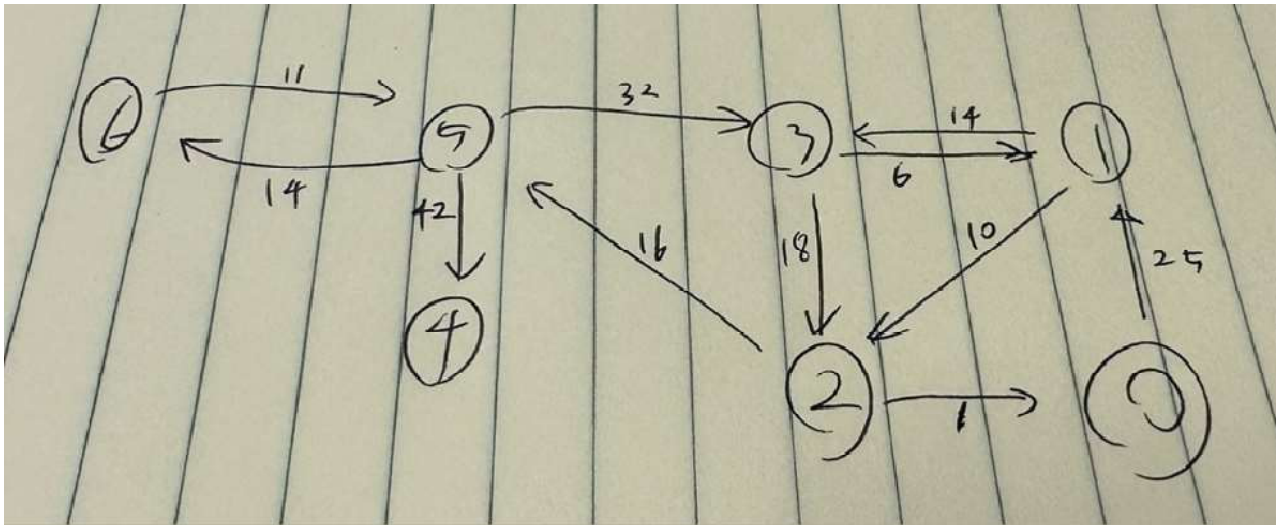
Task 0) 5 points

- Draw the graph represented as G in the code. Assign the numbers of vertices to the index of the adjacency matrix.



Task 3) 5 points

- Change the source vertex to any other vertex and see if the printSSCs() result changes.

- source_vertex = 0

```
Ajacency List of G
0 → 1, 25.000000 → nil
1 → 2, 10.000000 → 3, 14.000000 → nil
2 → 0, 1.000000 → 5, 16.000000 → nil
3 → 1, 6.000000 → 2, 18.000000 → nil
4 → nil
5 → 3, 32.000000 → 4, 42.000000 → 6, 14.000000 → nil
6 → 5, 11.000000 → nil
Ajacency List of GT
0 → 2, 1.000000 → nil
1 → 0, 25.000000 → 3, 6.000000 → nil
2 → 1, 10.000000 → 3, 18.000000 → nil
3 → 1, 14.000000 → 5, 32.000000 → nil
4 → 5, 42.000000 → nil
5 → 2, 16.000000 → 6, 11.000000 → nil
6 → 5, 14.000000 → nil
DFS result on G; Source Vertex: 0
0: d=1, f=14, pi=-1(root)
1: d=2, f=13, pi=0
2: d=3, f=12, pi=1
3: d=5, f=6, pi=5
4: d=7, f=8, pi=5
5: d=4, f=11, pi=2
6: d=9, f=10, pi=5
DFS result on GT; Source Vertex: 0
0: d=1, f=12, pi=-1(root)
1: d=3, f=10, pi=2
2: d=2, f=11, pi=0
3: d=4, f=9, pi=1
```

- source_vertex = 1

```
Ajacency List of G
0 → 1, 25.000000 → nil
1 → 2, 10.000000 → 3, 14.000000 → nil
2 → 0, 1.000000 → 5, 16.000000 → nil
3 → 1, 6.000000 → 2, 18.000000 → nil
4 → nil
5 → 3, 32.000000 → 4, 42.000000 → 6, 14.000000 → nil
6 → 5, 11.000000 → nil
Ajacency List of GT
0 → 2, 1.000000 → nil
1 → 0, 25.000000 → 3, 6.000000 → nil
2 → 1, 10.000000 → 3, 18.000000 → nil
3 → 1, 14.000000 → 5, 32.000000 → nil
4 → 5, 42.000000 → nil
5 → 2, 16.000000 → 6, 11.000000 → nil
6 → 5, 14.000000 → nil
DFS result on G; Source Vertex: 1
0: d=3, f=4, pi=2
1: d=1, f=14, pi=-1(root)
2: d=2, f=13, pi=1
3: d=6, f=7, pi=5
4: d=8, f=9, pi=5
5: d=5, f=12, pi=2
6: d=10, f=11, pi=5
DFS result on GT; Source Vertex: 1
0: d=2, f=11, pi=1
1: d=1, f=12, pi=-1(root)
2: d=3, f=10, pi=0
3: d=4, f=9, pi=2
```

- source_vertex = 2

```
Ajacency List of G
0 → 1, 25.000000 → nil
1 → 2, 10.000000 → 3, 14.000000 → nil
2 → 0, 1.000000 → 5, 16.000000 → nil
3 → 1, 6.000000 → 2, 18.000000 → nil
4 → nil
5 → 3, 32.000000 → 4, 42.000000 → 6, 14.000000 → nil
6 → 5, 11.000000 → nil
Ajacency List of GT
0 → 2, 1.000000 → nil
1 → 0, 25.000000 → 3, 6.000000 → nil
2 → 1, 10.000000 → 3, 18.000000 → nil
3 → 1, 14.000000 → 5, 32.000000 → nil
4 → 5, 42.000000 → nil
5 → 2, 16.000000 → 6, 11.000000 → nil
6 → 5, 14.000000 → nil
DFS result on G; Source Vertex: 2
0: d=2, f=7, pi=2
1: d=3, f=6, pi=0
2: d=1, f=14, pi=-1(root)
3: d=4, f=5, pi=1
4: d=9, f=10, pi=5
5: d=8, f=13, pi=2
6: d=11, f=12, pi=5
DFS result on GT; Source Vertex: 2
0: d=3, f=4, pi=1
1: d=2, f=11, pi=2
2: d=1, f=12, pi=-1(root)
3: d=5, f=10, pi=1
```

- source_vertex = 3

```
Ajacency List of G
0 → 1, 25.000000 → nil
1 → 2, 10.000000 → 3, 14.000000 → nil
2 → 0, 1.000000 → 5, 16.000000 → nil
3 → 1, 6.000000 → 2, 18.000000 → nil
4 → nil
5 → 3, 32.000000 → 4, 42.000000 → 6, 14.000000 → nil
6 → 5, 11.000000 → nil
Ajacency List of GT
0 → 2, 1.000000 → nil
1 → 0, 25.000000 → 3, 6.000000 → nil
2 → 1, 10.000000 → 3, 18.000000 → nil
3 → 1, 14.000000 → 5, 32.000000 → nil
4 → 5, 42.000000 → nil
5 → 2, 16.000000 → 6, 11.000000 → nil
6 → 5, 14.000000 → nil
DFS result on G; Source Vertex: 3
0: d=4, f=5, pi=2
1: d=2, f=13, pi=3
2: d=3, f=12, pi=1
3: d=1, f=14, pi=-1(root)
4: d=7, f=8, pi=5
5: d=6, f=11, pi=2
6: d=9, f=10, pi=5
DFS result on GT; Source Vertex: 3
0: d=3, f=6, pi=1
1: d=2, f=7, pi=3
2: d=4, f=5, pi=0
3: d=1, f=12, pi=-1(root)
```

- source_vertex = 4

```
Ajacency List of G
0 → 1, 25.000000 → nil
1 → 2, 10.000000 → 3, 14.000000 → nil
2 → 0, 1.000000 → 5, 16.000000 → nil
3 → 1, 6.000000 → 2, 18.000000 → nil
4 → nil
5 → 3, 32.000000 → 4, 42.000000 → 6, 14.000000 → nil
6 → 5, 11.000000 → nil
Ajacency List of GT
0 → 2, 1.000000 → nil
1 → 0, 25.000000 → 3, 6.000000 → nil
2 → 1, 10.000000 → 3, 18.000000 → nil
3 → 1, 14.000000 → 5, 32.000000 → nil
4 → 5, 42.000000 → nil
5 → 2, 16.000000 → 6, 11.000000 → nil
6 → 5, 14.000000 → nil
DFS result on G; Source Vertex: 4
0: d=3, f=14, pi=-1(root)
1: d=4, f=13, pi=0
2: d=5, f=12, pi=1
3: d=7, f=8, pi=5
4: d=1, f=2, pi=-1(root)
5: d=6, f=11, pi=2
6: d=9, f=10, pi=5
DFS result on GT; Source Vertex: 0
0: d=1, f=12, pi=-1(root)
1: d=3, f=10, pi=2
2: d=2, f=11, pi=0
3: d=4, f=9, pi=1
```

- source_vertex = 5

```
Ajacency List of G
0 → 1, 25.000000 → nil
1 → 2, 10.000000 → 3, 14.000000 → nil
2 → 0, 1.000000 → 5, 16.000000 → nil
3 → 1, 6.000000 → 2, 18.000000 → nil
4 → nil
5 → 3, 32.000000 → 4, 42.000000 → 6, 14.000000 → nil
6 → 5, 11.000000 → nil
Ajacency List of GT
0 → 2, 1.000000 → nil
1 → 0, 25.000000 → 3, 6.000000 → nil
2 → 1, 10.000000 → 3, 18.000000 → nil
3 → 1, 14.000000 → 5, 32.000000 → nil
4 → 5, 42.000000 → nil
5 → 2, 16.000000 → 6, 11.000000 → nil
6 → 5, 14.000000 → nil
DFS result on G; Source Vertex: 5
0: d=5, f=6, pi=2
1: d=3, f=8, pi=3
2: d=4, f=7, pi=1
3: d=2, f=9, pi=5
4: d=10, f=11, pi=5
5: d=1, f=14, pi=-1(root)
6: d=12, f=13, pi=5
DFS result on GT; Source Vertex: 5
0: d=4, f=5, pi=1
1: d=3, f=8, pi=2
2: d=2, f=9, pi=5
3: d=6, f=7, pi=1
```

- source_vertex = 6

```
Ajacency List of G
0 → 1, 25.000000 → nil
1 → 2, 10.000000 → 3, 14.000000 → nil
2 → 0, 1.000000 → 5, 16.000000 → nil
3 → 1, 6.000000 → 2, 18.000000 → nil
4 → nil
5 → 3, 32.000000 → 4, 42.000000 → 6, 14.000000 → nil
6 → 5, 11.000000 → nil
Ajacency List of GT
0 → 2, 1.000000 → nil
1 → 0, 25.000000 → 3, 6.000000 → nil
2 → 1, 10.000000 → 3, 18.000000 → nil
3 → 1, 14.000000 → 5, 32.000000 → nil
4 → 5, 42.000000 → nil
5 → 2, 16.000000 → 6, 11.000000 → nil
6 → 5, 14.000000 → nil
DFS result on G; Source Vertex: 6
0: d=6, f=7, pi=2
1: d=4, f=9, pi=3
2: d=5, f=8, pi=1
3: d=3, f=10, pi=5
4: d=11, f=12, pi=5
5: d=2, f=13, pi=6
6: d=1, f=14, pi=-1(root)
DFS result on GT; Source Vertex: 6
0: d=5, f=6, pi=1
1: d=4, f=9, pi=2
2: d=3, f=10, pi=5
3: d=7, f=8, pi=1
```