ECS 122A B01-B03 FQ 2021 Homework 06

Geoffrey Mohn

TOTAL POINTS

97 / 100

QUESTION 1

1 Q1 **25 / 25**

✓ **+ 25 pts** *All Correct*

QUESTION 2

2 Q2 **30 / 30**

✓ **+ 30 pts** *All Correct*

+ 25 pts All Correct but no mention of distances/table

+ 25 pts All Correct but no mention of shortest paths

+ 20 pts Incomplete Solution

QUESTION 3

3 Q3 **25 / 25**

✓ **+ 25 pts** *Correct*

+ 20 pts Incomplete algorithm

+ 15 pts No description of algotihm

+ 0 pts Invalid/No Submission

QUESTION 4

4 Q4 **17 / 20**

+ 20 pts Correct

✓ **+ 10 pts** *Part 1 Correct*

+ 10 pts Part 2 Correct

✓ **+ 7 pts** *Part 2 Partially Correct*

+ 5 pts Incorrect Explanation in Part 1

+ 7 pts Part 1 Partially Correct

+ 5 pts Incorrect Explanation in Part 2

+ 0 pts Invalid/No Submission

+ 0 pts Wrong proof in both the parts

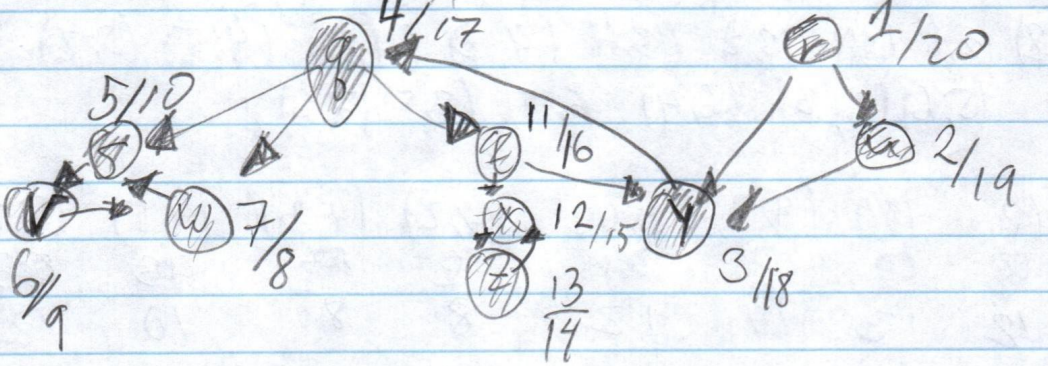
1) 1) adj[q] = [s, t, w]
adj[r] = [u, y]
adj[s] = [v]
adj[t] = [x, y]
adj[u] = [y]
adj[v] = [w]
adj[w] = [s]
adj[x] = [z]
adj[y] = [q]
adj[z] = [x]

2) BFS, s

	r	u	y	q	s	t	w	v	x	z
d	0	~~∞~~ 1	~~∞~~ 1	~~∞~~ 2	∞	∞	∞	∞	∞	∞
π	Null	~~Null~~ r	~~Null~~ r	Null	Null	Null	Null	Null	Null	Null

	s	r	u	y	q	t	w	v	x	z
d	0	1	1	2	3	3	3	4	4	5
π	Null	r	r	y	q	q	q	s	t	x

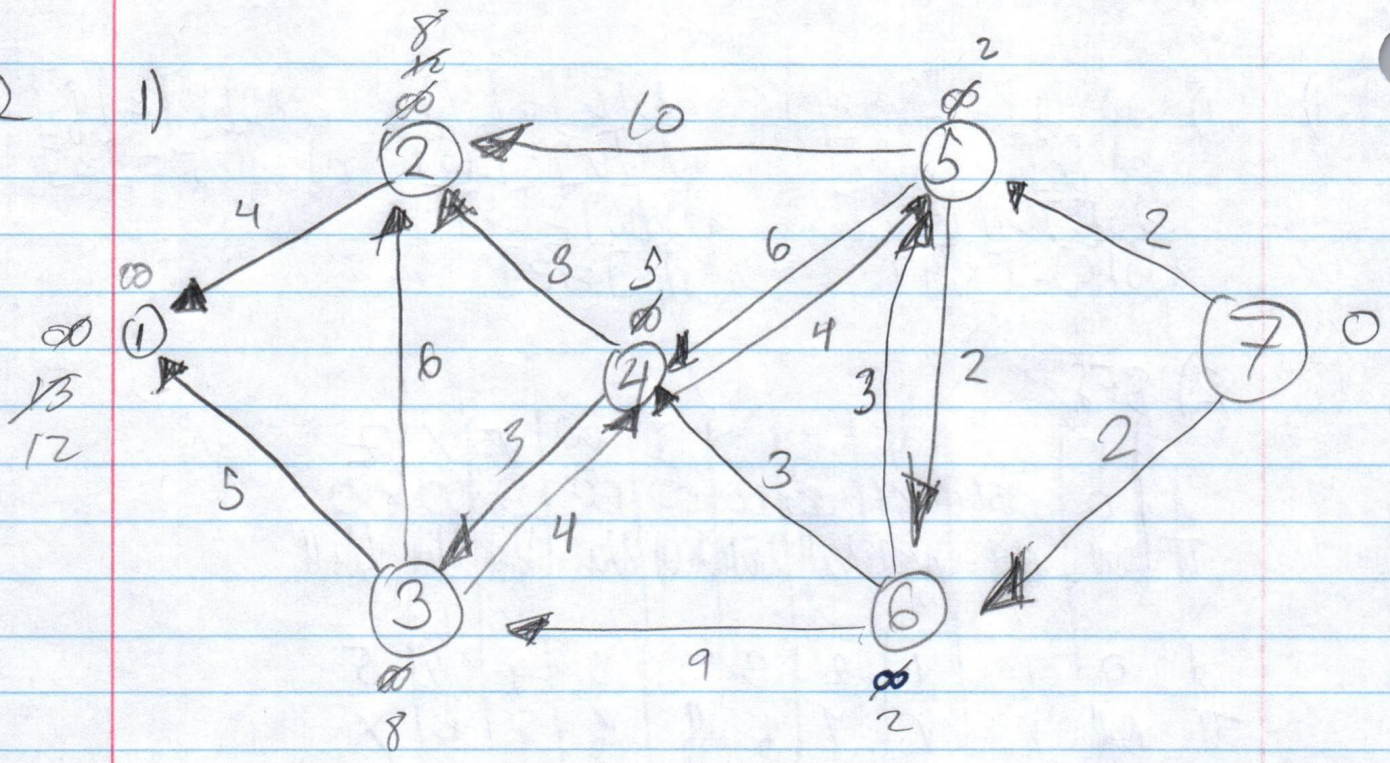
3)



1 Q1 **25 / 25**

✓ **+ 25 pts** *All Correct*

2 1)



2) (2,1) (3,1) (3,2 (3,4 (4,2) (4,3) (4,5) (5,2) (5,4)
(5,6) (6,3) (6,4) (6,5) (7,5) (7,6)

(2,1)	(3,1)	(3,2)	(3,4)	(4,2)	(4,3)	(4,5)	(5,2)
∞	∞	∞	∞	∞	∞	∞	∞
12	13	14	12	8	8	10	12

(5,4)	(5,6)	(6,3)	(6,4)	(6,5)	(7,5)	(7,6)
∞	∞	∞	∞	∞	∞	∞
8	4	11	5	5	2	2

2 Q2 **30 / 30**

✓ **+ 30 pts** *All Correct*

+ 25 pts All Correct but no mention of distances/table

+ 25 pts All Correct but no mention of shortest paths

+ 20 pts Incomplete Solution

3) Bellman Ford's algorithm as long as there are no negative cycles

```
O(VE)
G(V,E]
d[s] = 0                    Every edge is negative weight
                            S = Source vertex
                            d = distance
for E in G[V,E]
    if d[v] < d[u]          Relax all edges k times
      relax (u,v,w)
    if d[v] > d[u] + w(u,v)
        return false.       — Negative cycle
```

Relaxation

3 Q3 **25 / 25**

✓ **+ 25 pts** *Correct*

+ 20 pts Incomplete algorithm

+ 15 pts No description of algotihm

+ 0 pts Invalid/No Submission

4) $G = (V, E, w)$ $\quad s \in V$

$\pi[s] = 0$ to be visited again it must be a cyclic graph, & to be updated for $\pi[s] = 0$ the edge must be negative ∴ it is a negative cycle through s

2) Stop when find vertex s or the vertex is grayed & has been seen before. Stop & output if there is a negative cycle through s so that $\pi[s]$ doesn't get updated

4 Q4 **17 / 20**

+ 20 pts Correct

✓ **+ 10 pts** *Part 1 Correct*

+ 10 pts Part 2 Correct

✓ **+ 7 pts** *Part 2 Partially Correct*

+ 5 pts Incorrect Explanation in Part 1

+ 7 pts Part 1 Partially Correct

+ 5 pts Incorrect Explanation in Part 2

+ 0 pts Invalid/No Submission

+ 0 pts Wrong proof in both the parts