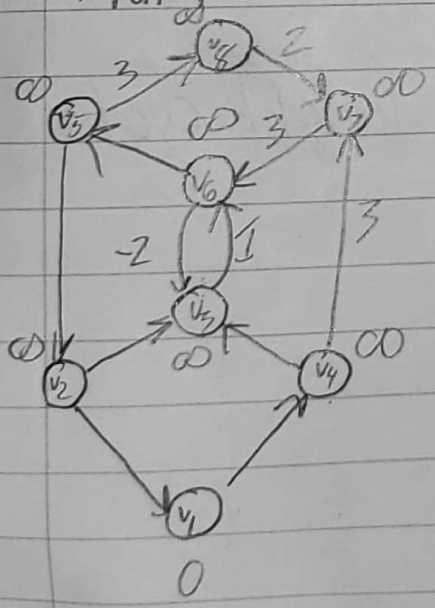
5/6/2023 (1) Adam Conn

Sat

HW5 Final Draft

- V_1 is source, using Bellman-Ford Class
- edge list:
  $(V_1, V_4), (V_2, V_1), (V_2, V_3), (V_3, V_6), (V_4, V_7), (V_5, V_2), (V_5, V_8), (V_6, V_3), (V_6, V_5), (V_7, V_6), (V_8, V_7)$
- 8 iterations
  - 7 iterations for relating
  - 1 iteration for checking negative weight cycle
- start:



(2)

— Table

k \ v	1	2	3	4	5	6	7	8	
0	0	∞	∞	∞	∞	∞	∞	∞	] initialize
1	0	∞	5	1	∞	7	4	∞	
2	0	∞	4	1	7	6	4	∞	
3	0	11	3	1	6	5	4	10	
4	0	10	2	1	5	4	4	9	relax
5	0	9	1	1	4	3	4	8	
6	0	8	0	1	3	2	4	7	
7	0	7	-1	1	2	1	4	6	
8	0	7	-1	1	2	0	4	6	] check

iterations

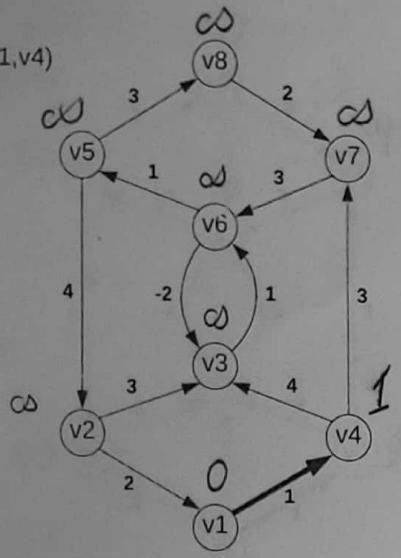
return "G has a negative weight cycle"

Problem 1

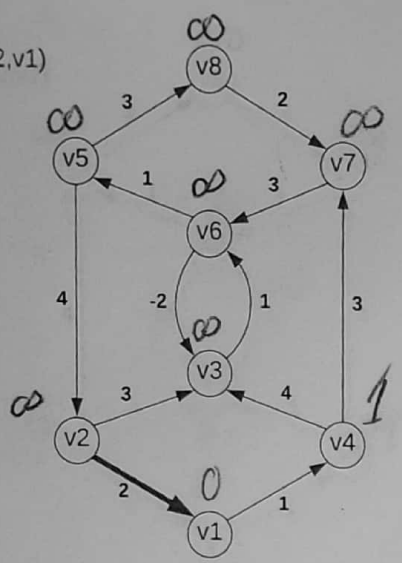
Iteration 1 (k=1)

at final stage of iteration, parents shown

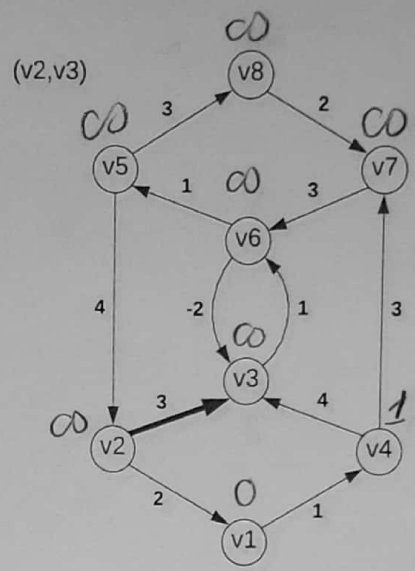
(v1,v4)



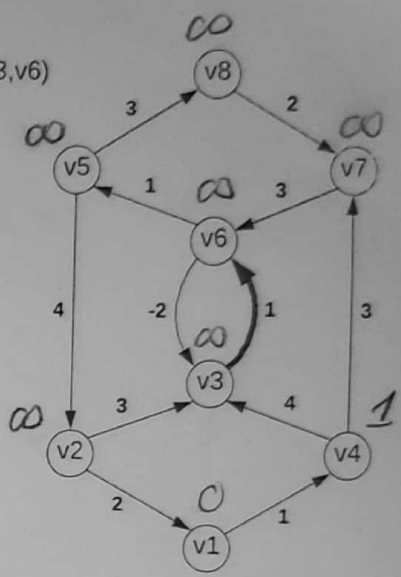
(v2,v1)



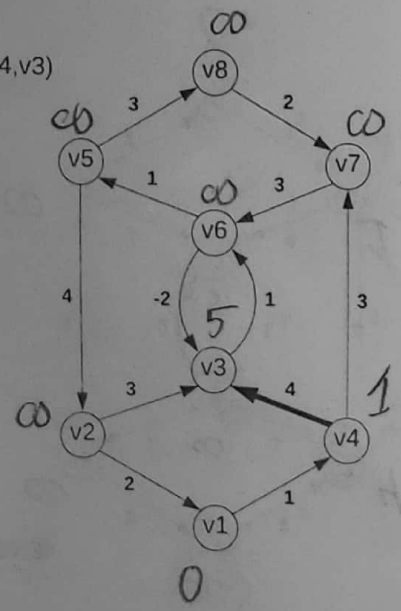
(v2,v3)



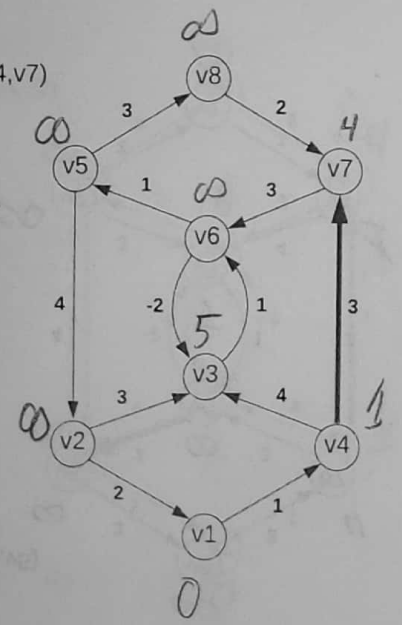
(v3,v6)



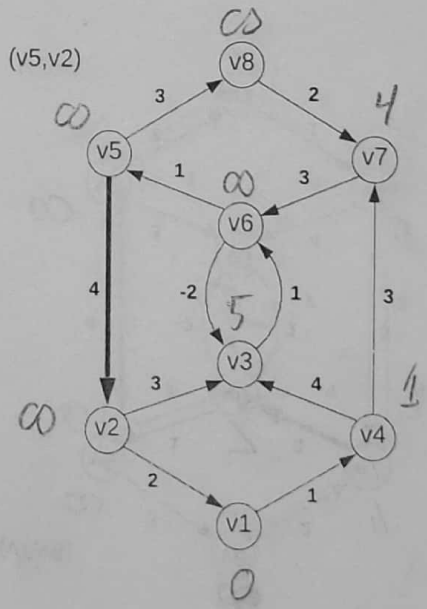
(v4,v3)



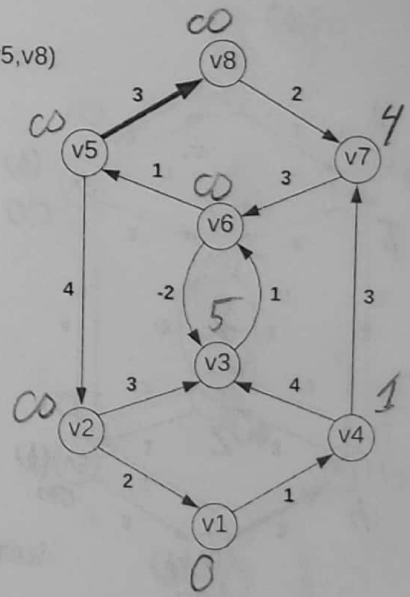
(v4,v7)



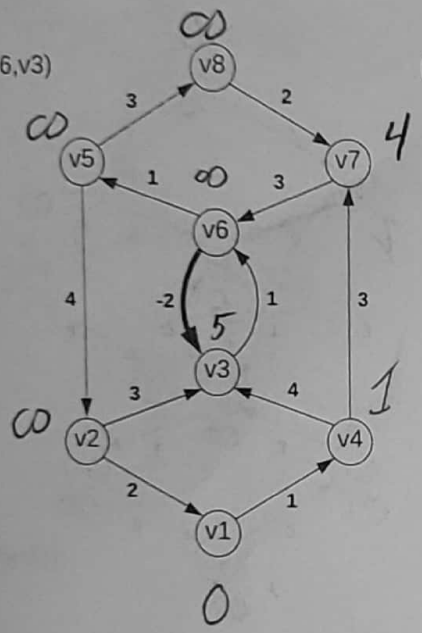
(v5,v2)



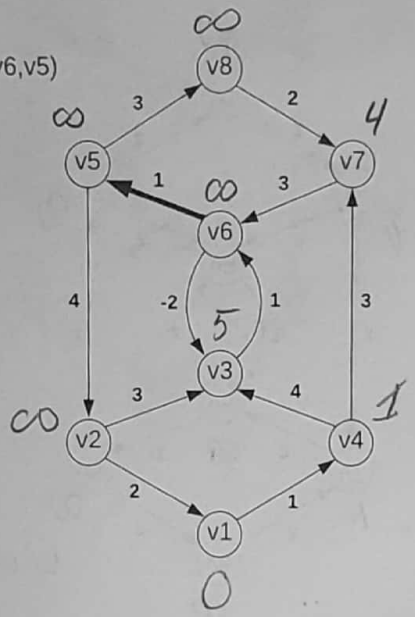
(v5,v8)



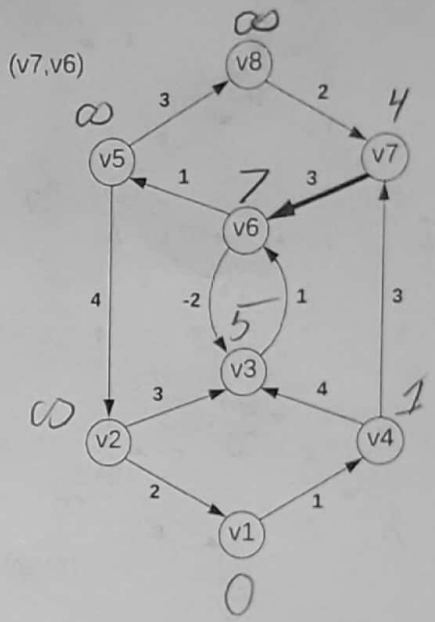
(v6,v3)



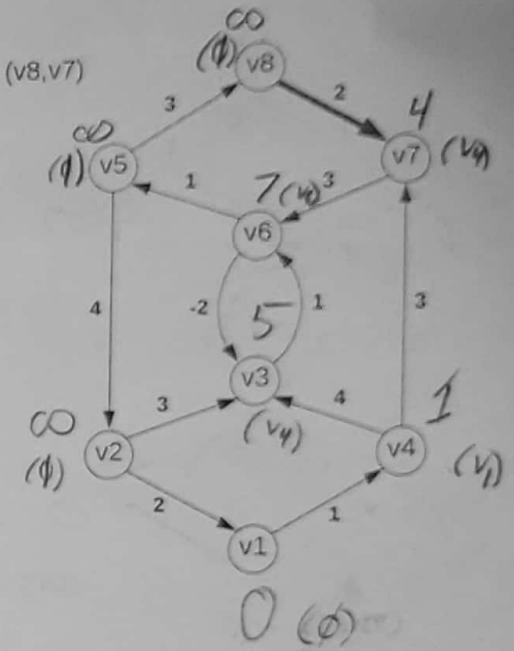
(v6,v5)



(v7,v6)

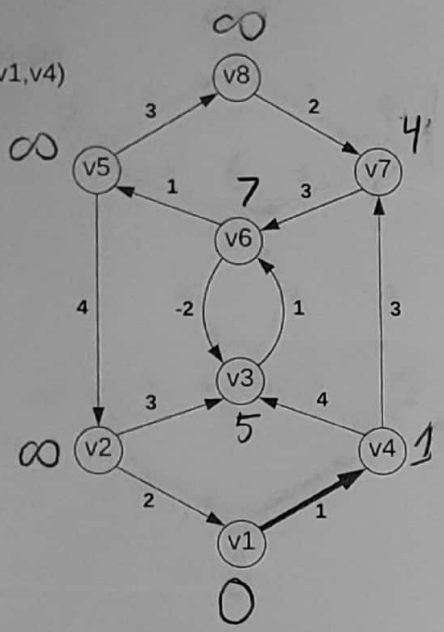


(v8,v7)

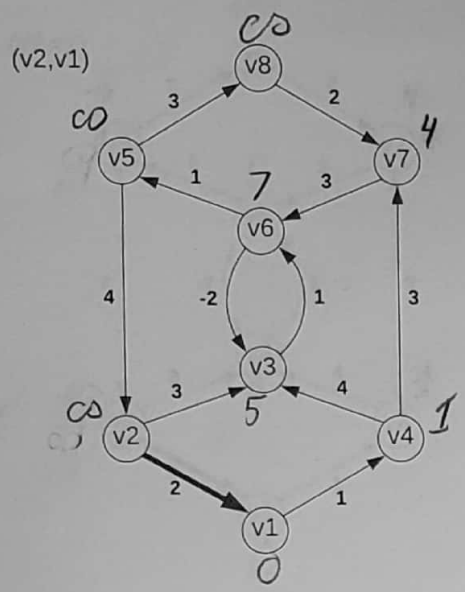


Iteration 2 (k=2)

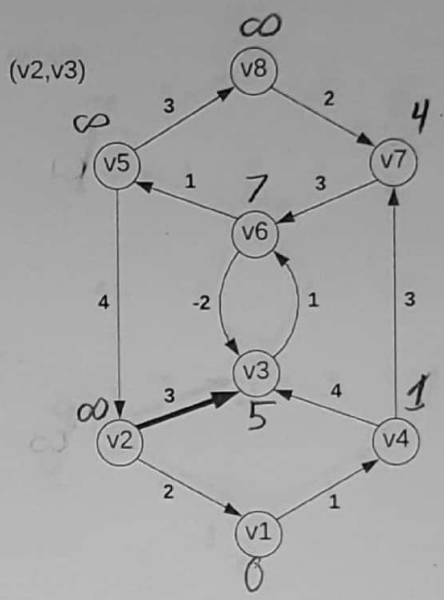
(v1,v4)



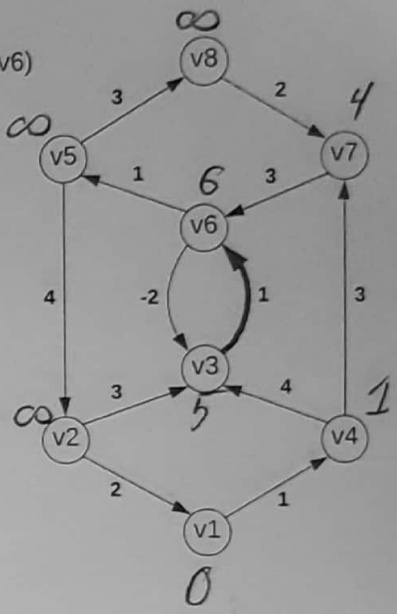
(v2,v1)



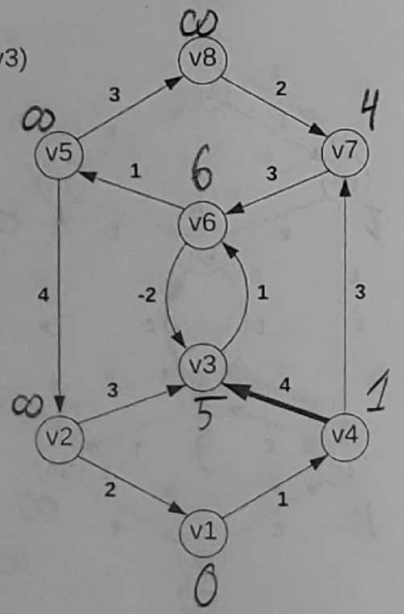
(v2,v3)



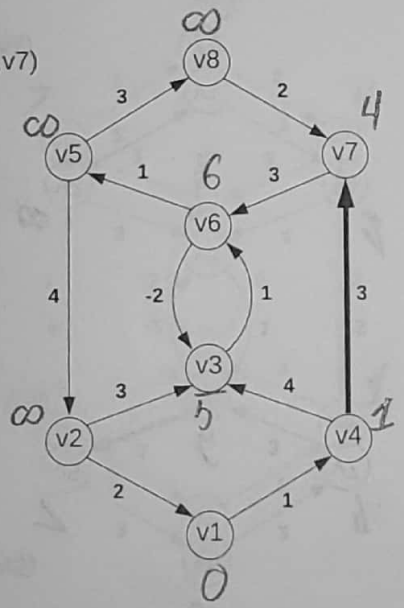
(v3,v6)



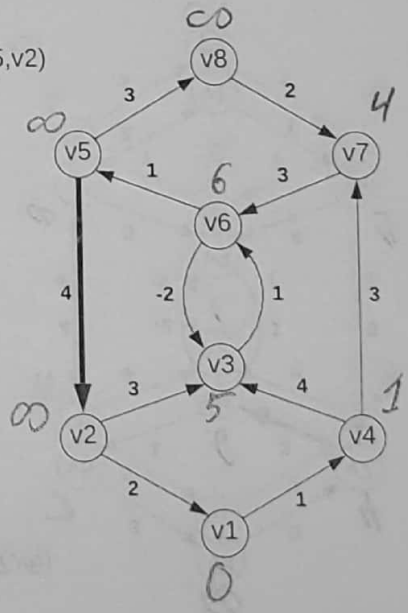
(v4,v3)



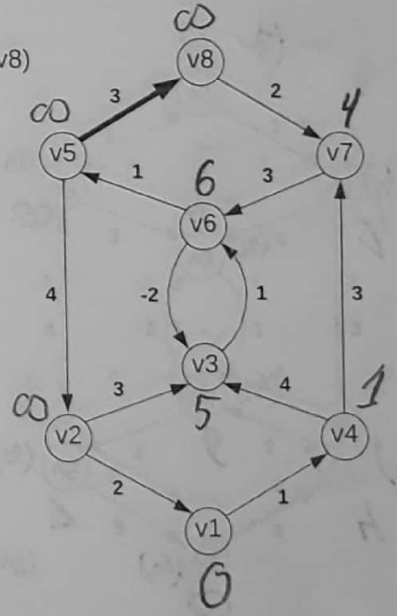
(v4,v7)



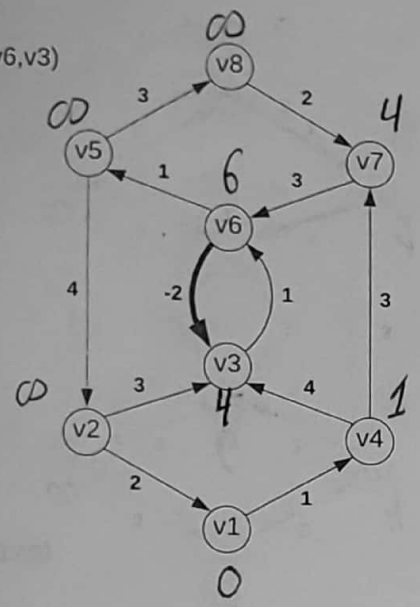
(v5,v2)



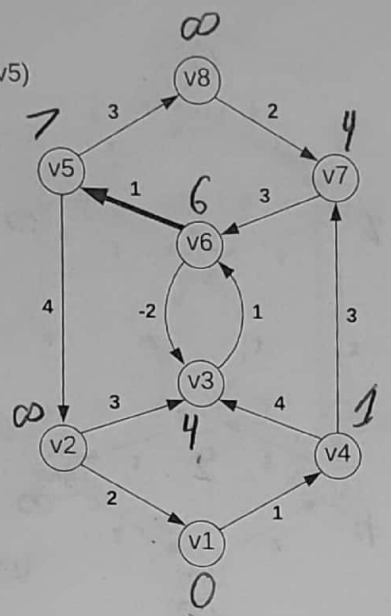
(v5,v8)



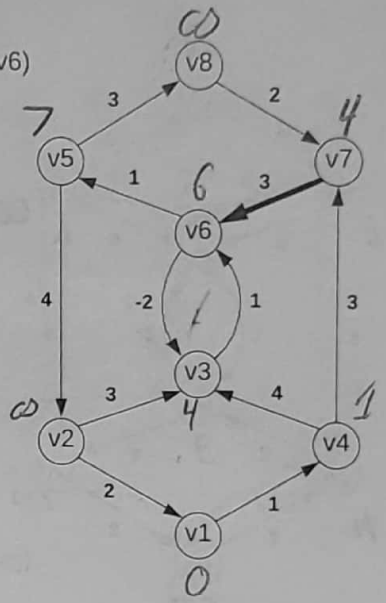
(v6,v3)



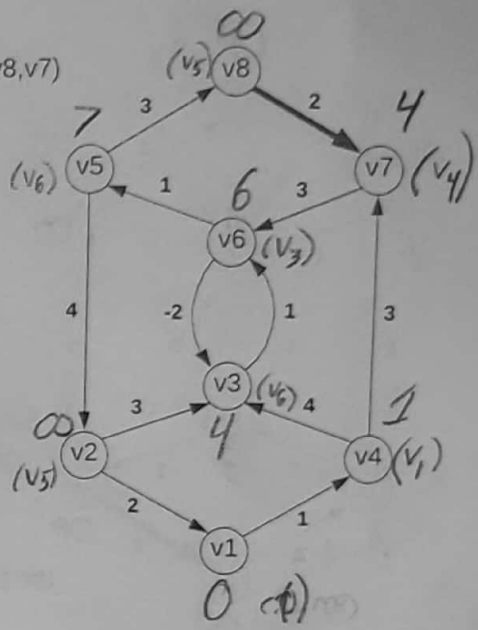
(v6,v5)



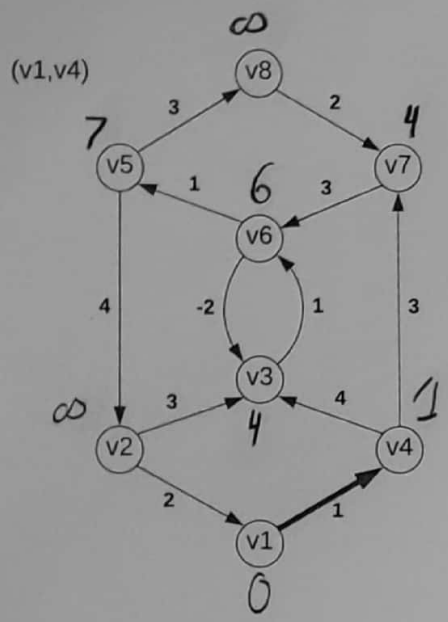
(v7,v6)

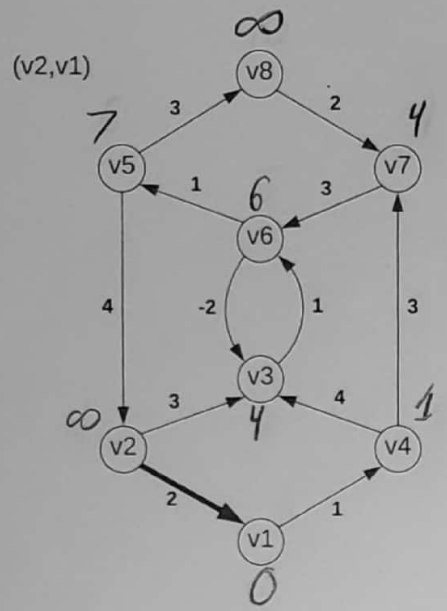


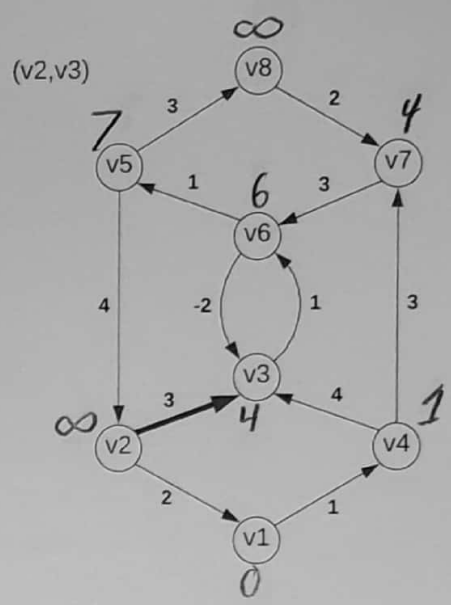
(v8,v7)

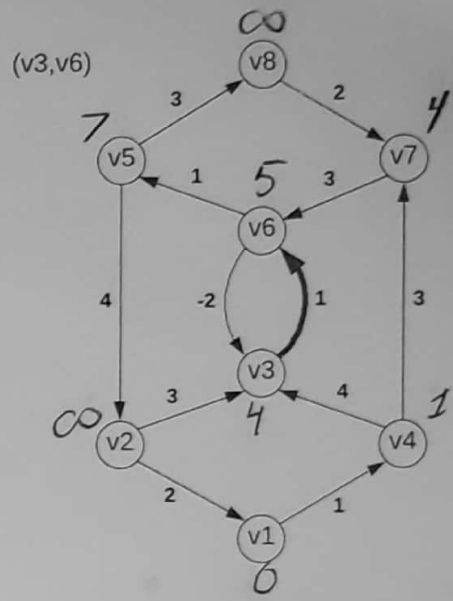


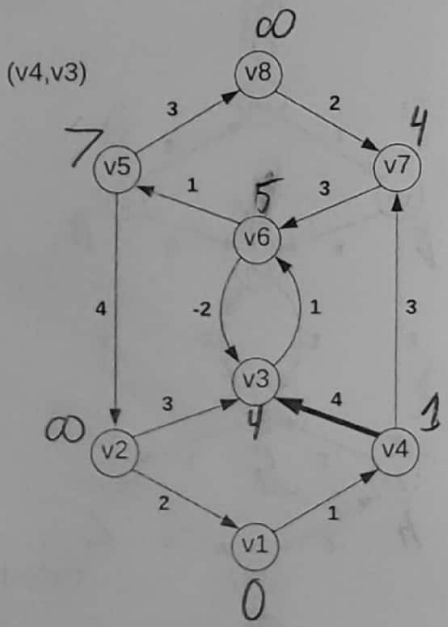
Iteration 3 (k=3)

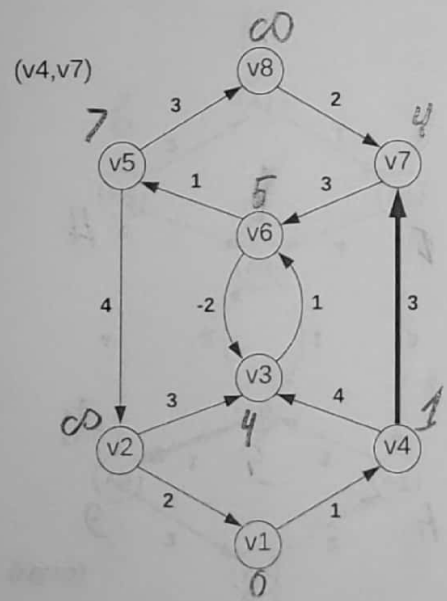


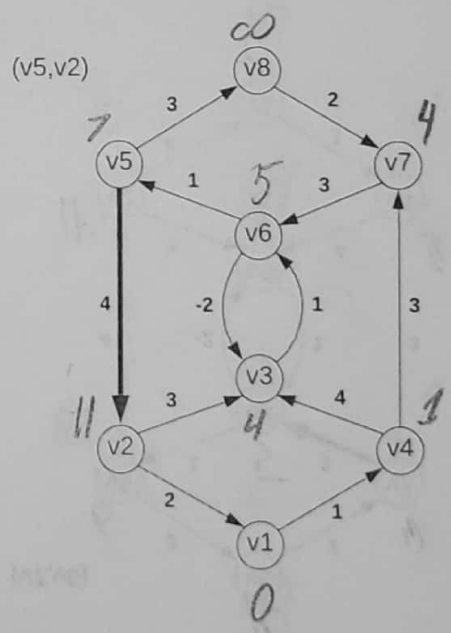


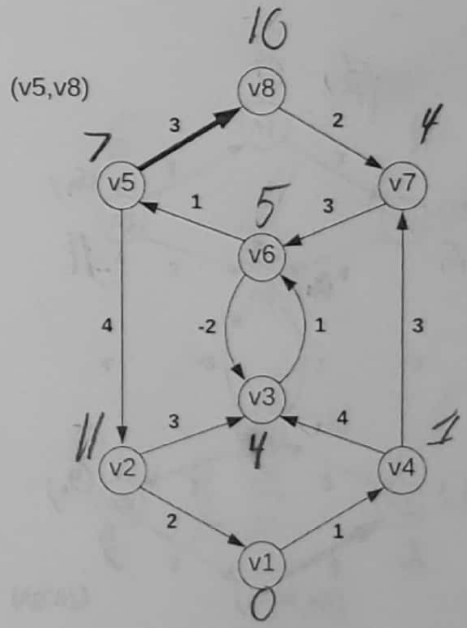




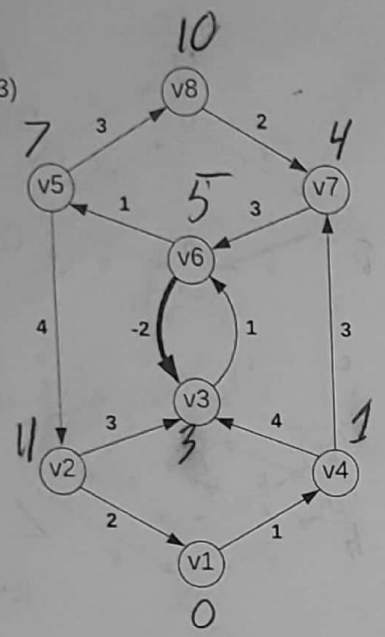




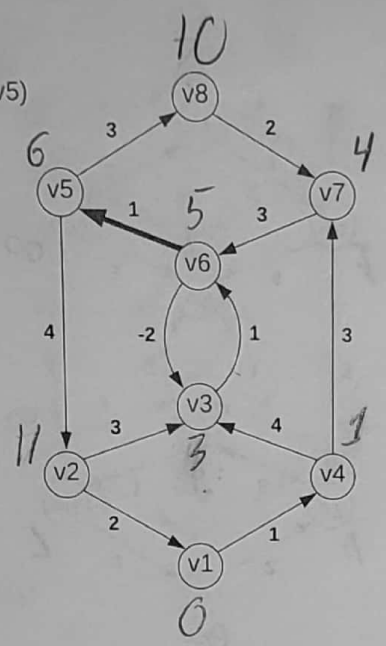




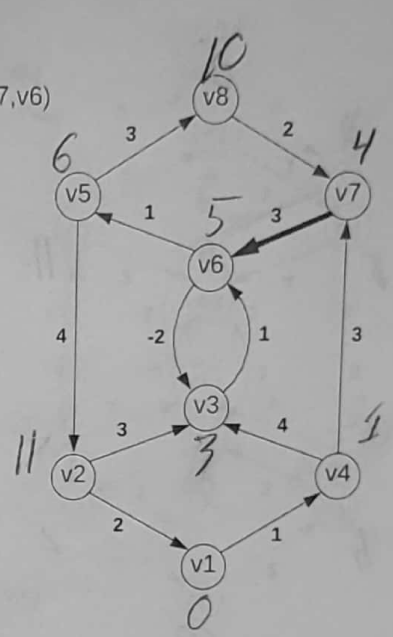
(v6,v3)



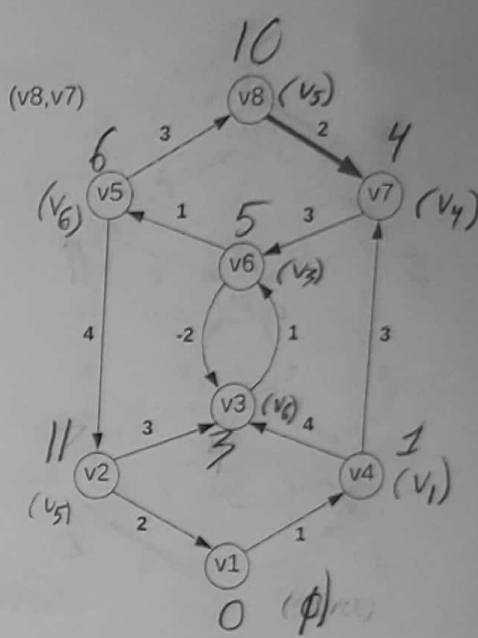
(v6,v5)



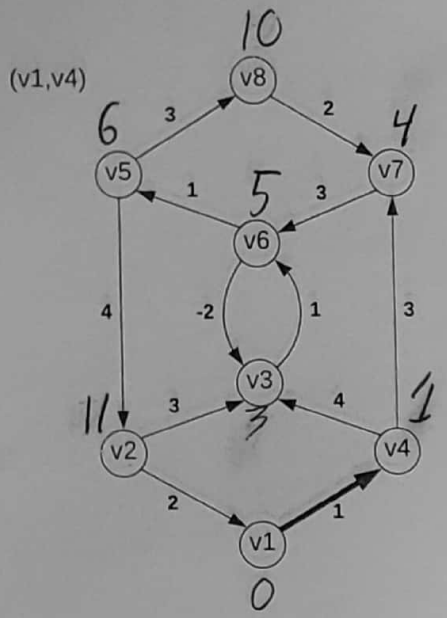
(v7,v6)

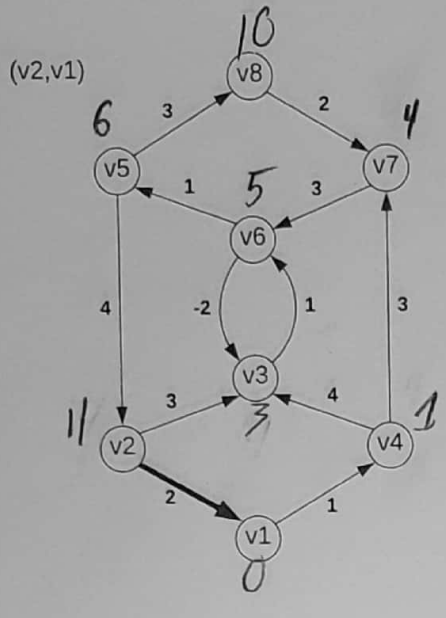


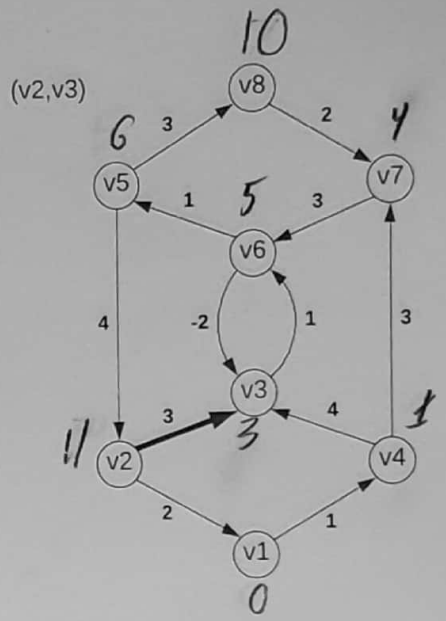
(v8,v7)

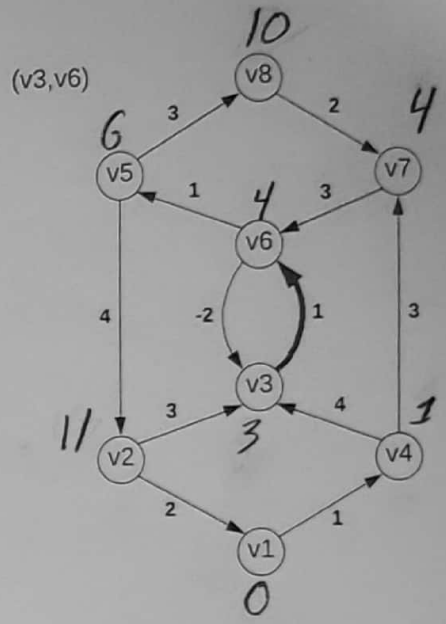


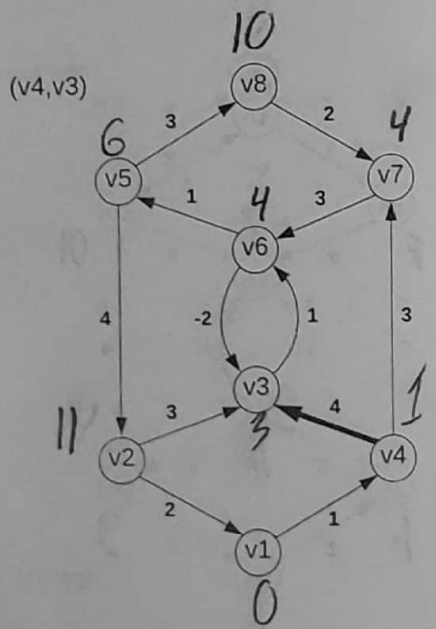
Iteration 4 (k=4)

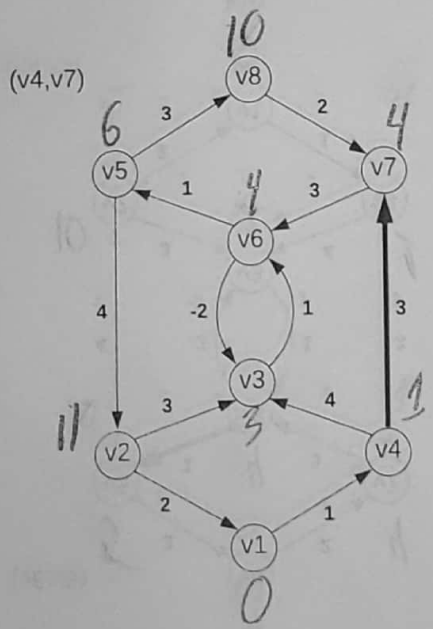


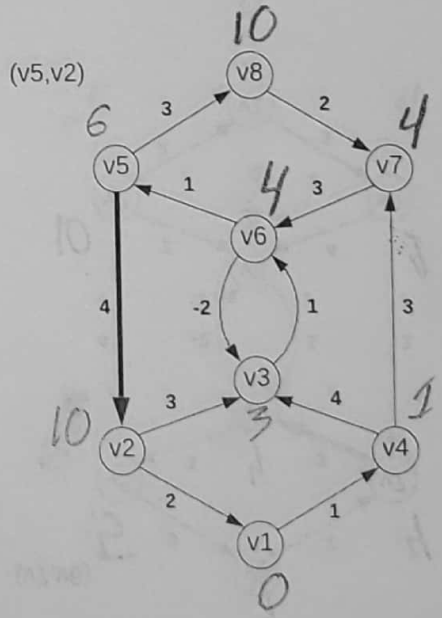


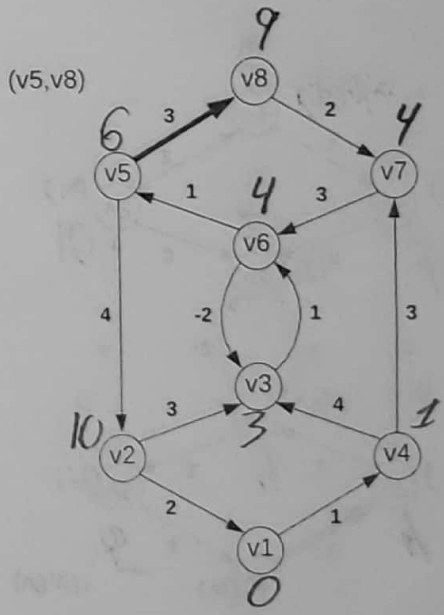


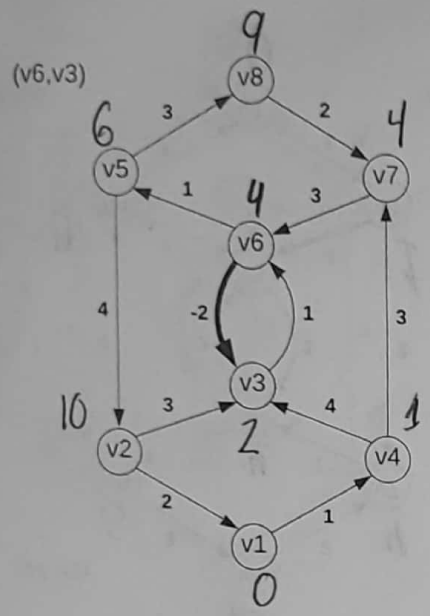


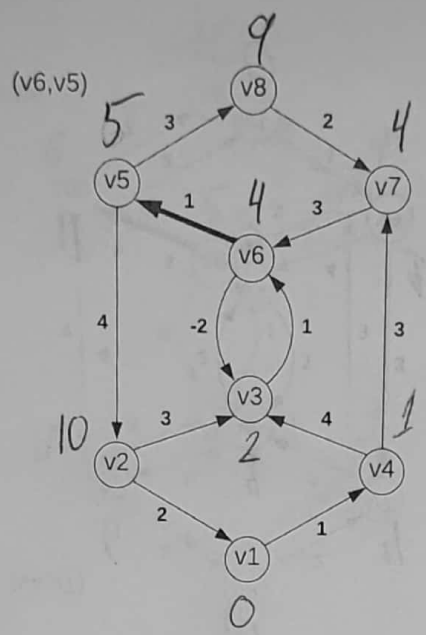


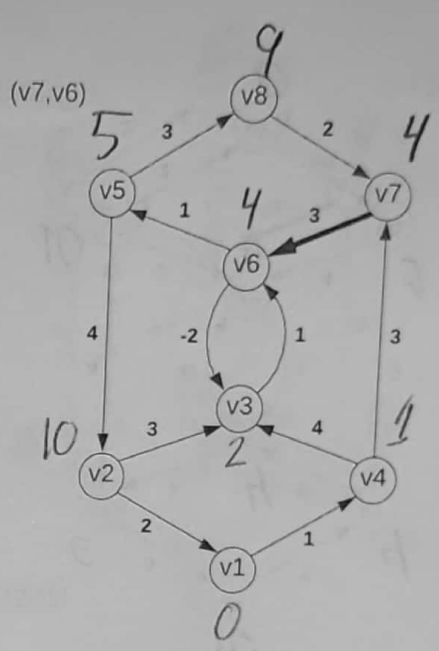


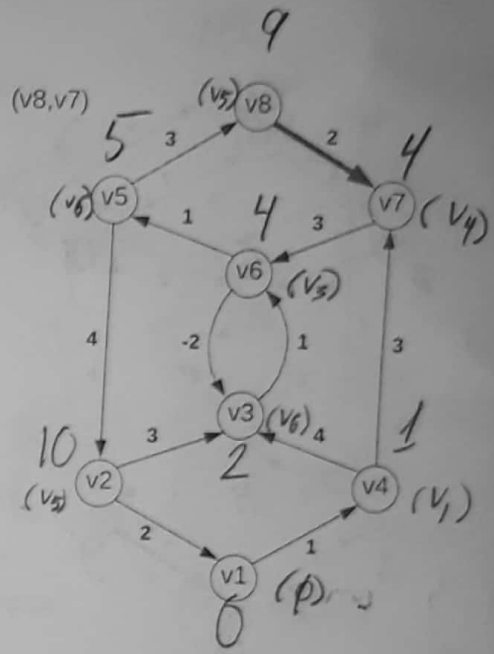





(v6,v3)
v8
v5
v7
v6
v3
v2
v4
v1
9
6
4
4
10
2
1
0

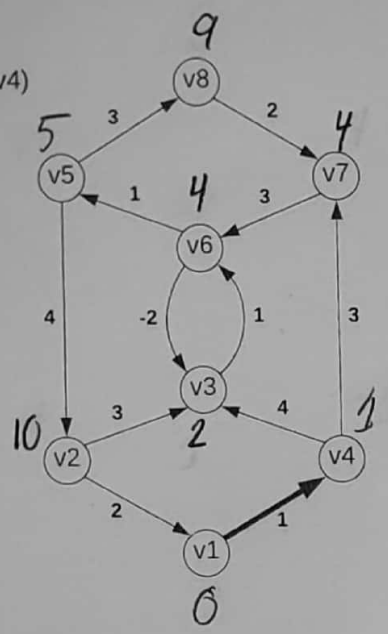

(v6,v5)
v8
v5
v7
v6
v3
v2
v4
v1
9
5
4
4
10
2
1
0


(v7,v6)
v8
v5
v7
v6
v3
v2
v4
v1
9
5
4
4
10
2
1
0

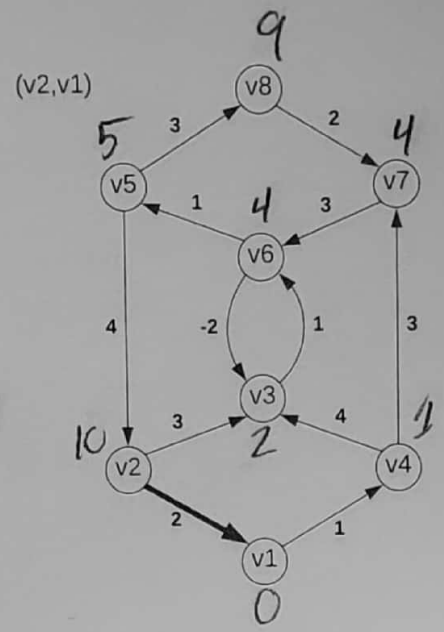

(v8,v7)
v8
v5
v7
v6
v3
v2
v4
v1
9
5
4
4
10
2
1
0

Iteration 5 (k=5)

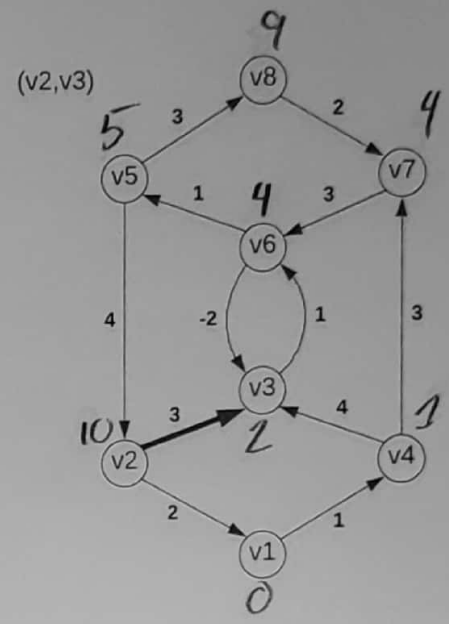
(v1,v4)



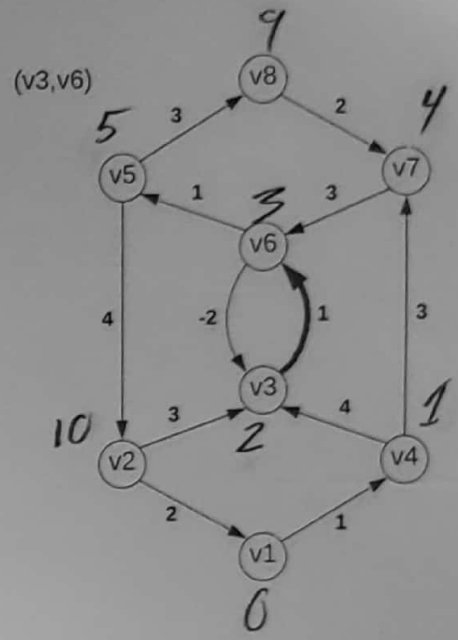
(v2,v1)



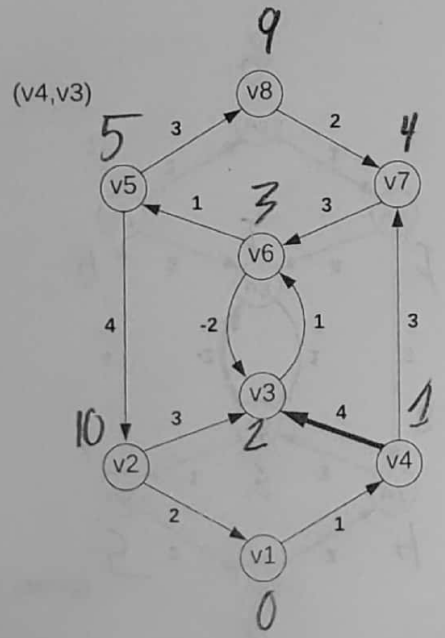
(v2,v3)



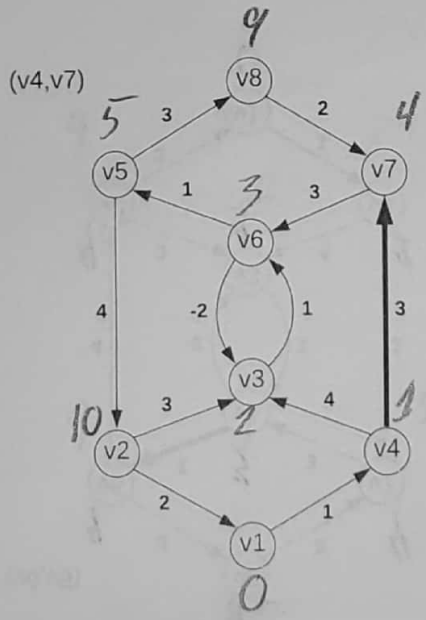
(v3,v6)



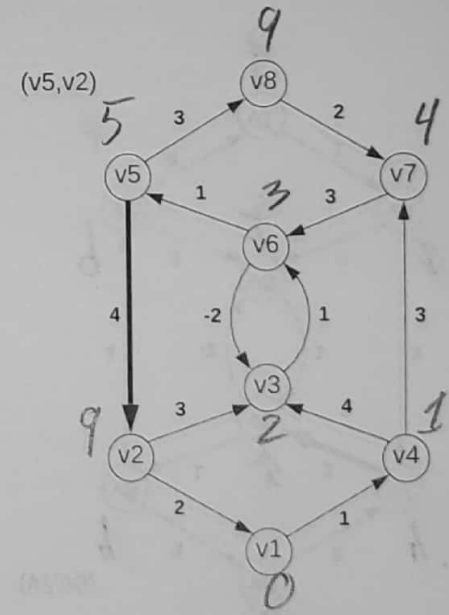
(v4,v3)



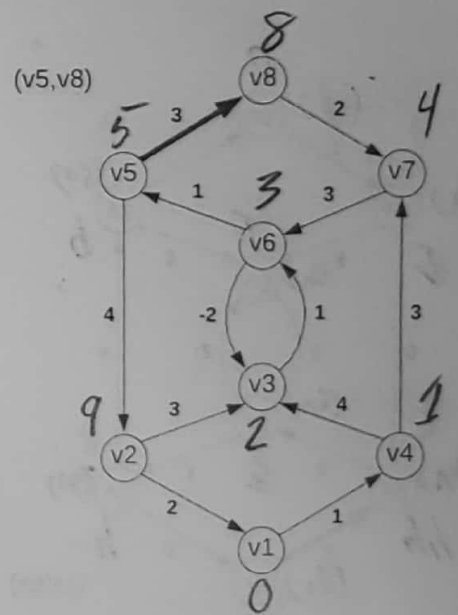
(v4,v7)

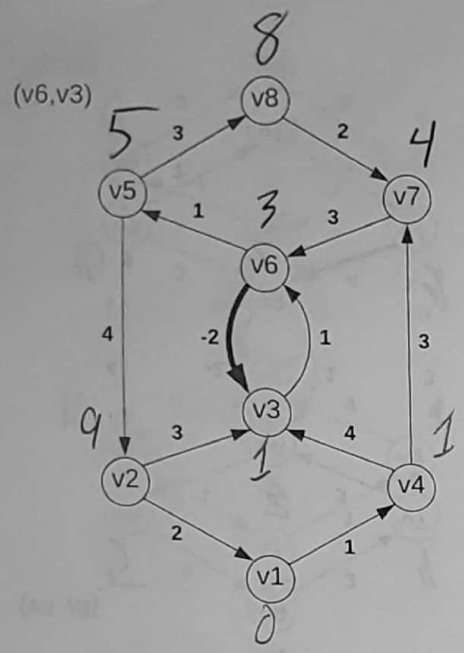


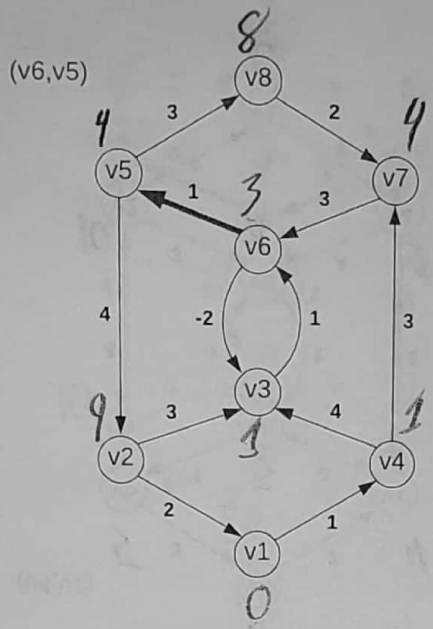
(v5,v2)

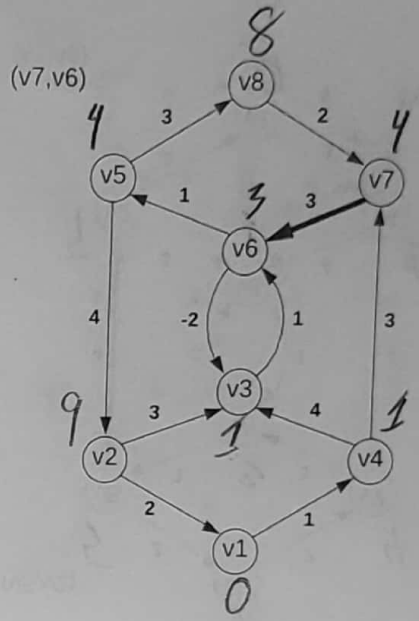


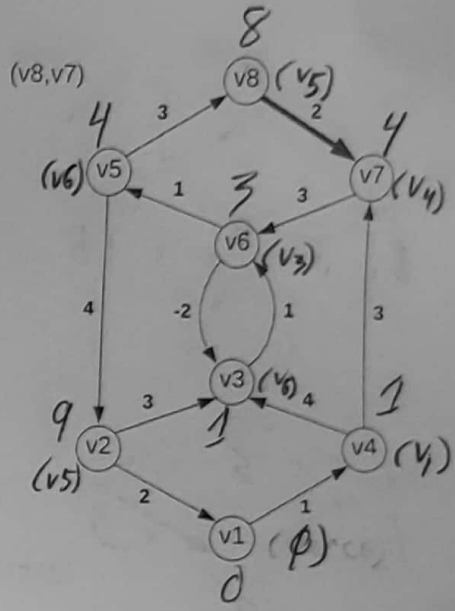
(v5,v8)




(v6,v3)
8
v8
5
3
2
4
v5
v7
1
3
3
v6
4
-2
1
3
9
v3
3
4
1
1
v2
v4
2
1
v1
0

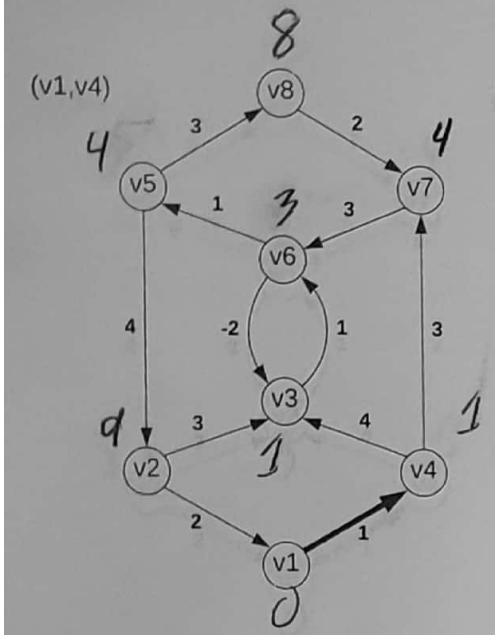

(v6,v5)
8
v8
4
3
2
4
v5
v7
1
3
3
v6
4
-2
1
3
9
v3
3
4
1
1
v2
v4
2
1
v1
0

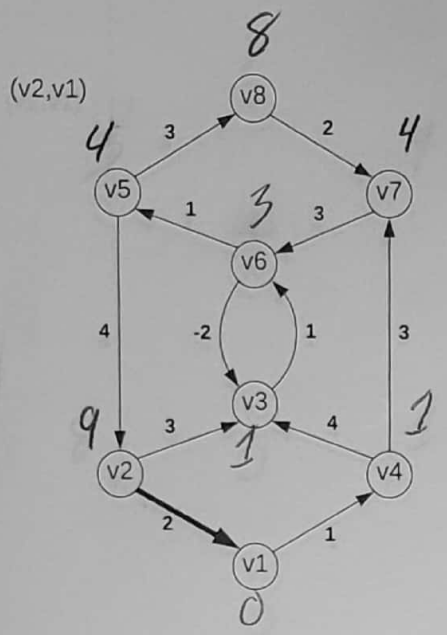

(v7,v6)
8
v8
4
3
2
4
v5
v7
1
3
3
v6
4
-2
1
3
9
v3
3
4
1
1
v2
v4
2
1
v1
0

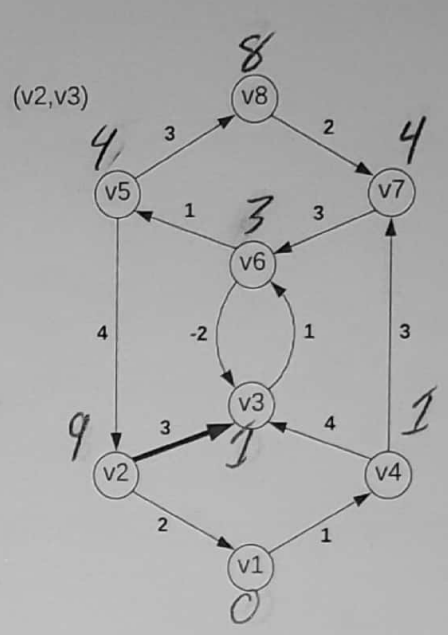

(v8,v7)
8
v8
(v5)
2
4
3
4
(v6)
v5
v7
(v4)
1
3
3
v6
(v3)
4
-2
1
3
v3
(v6)
4
9
3
1
1
(v5)
v2
v4
(v1)
2
1
v1
(p)
0

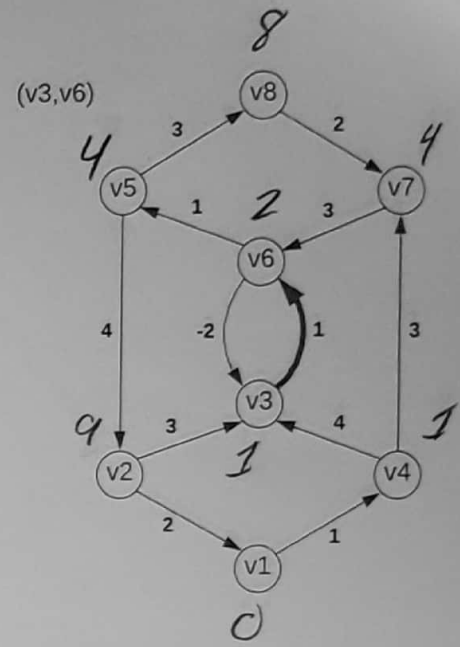
4
v1
2

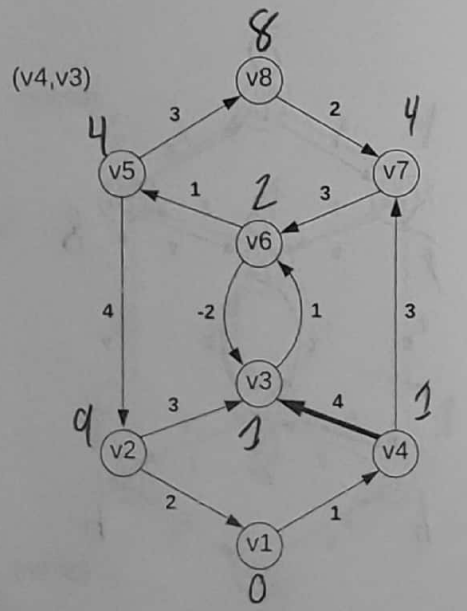
Iteration 6 (k=6)

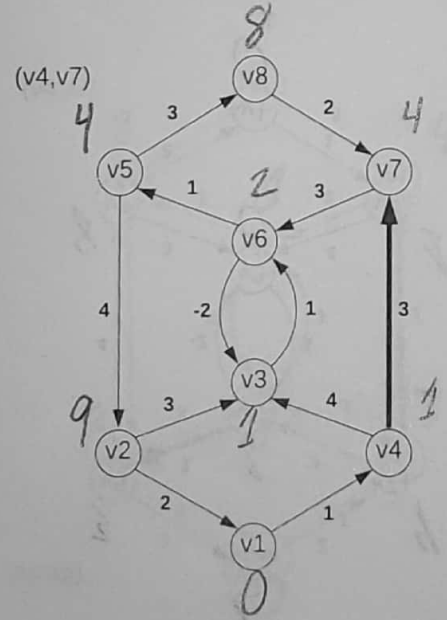


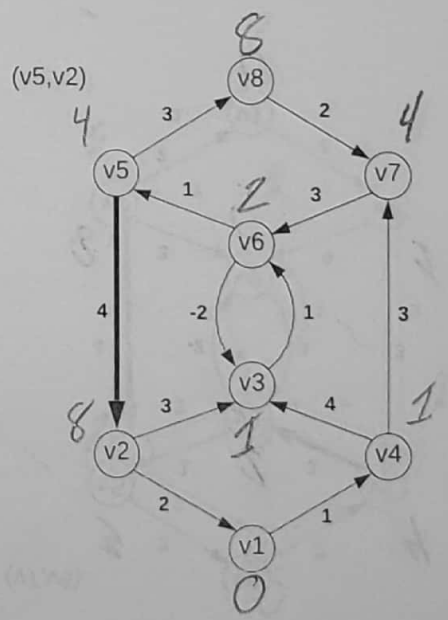


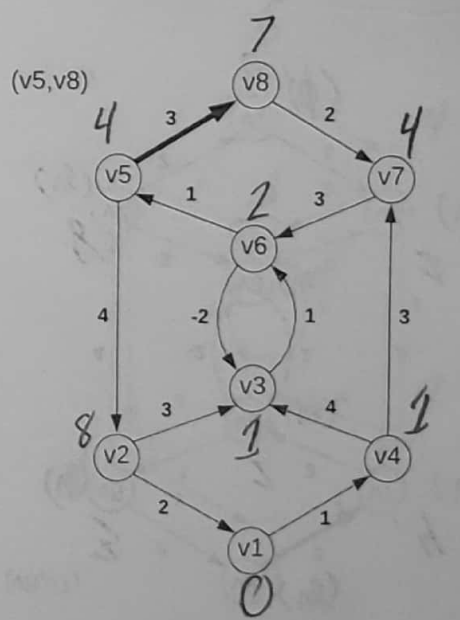


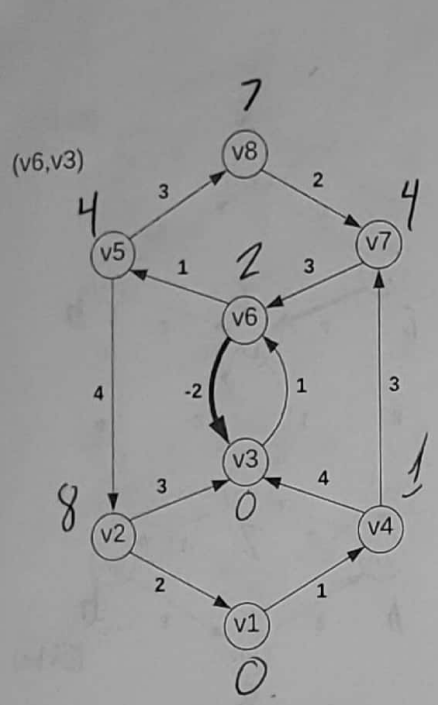


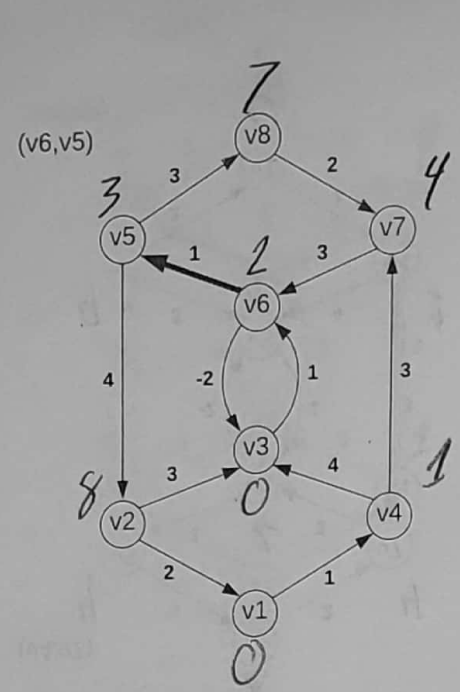


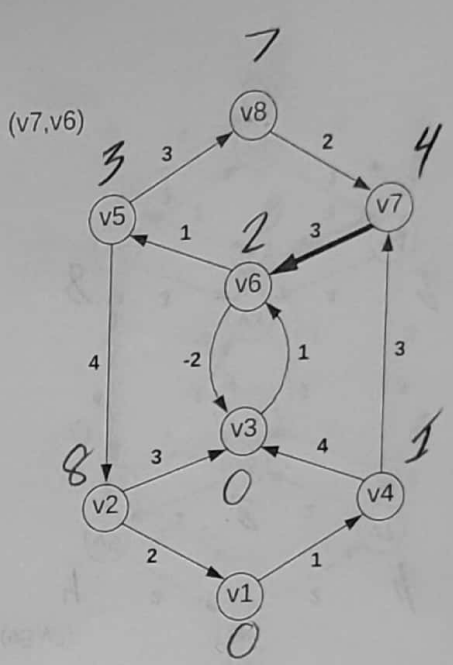


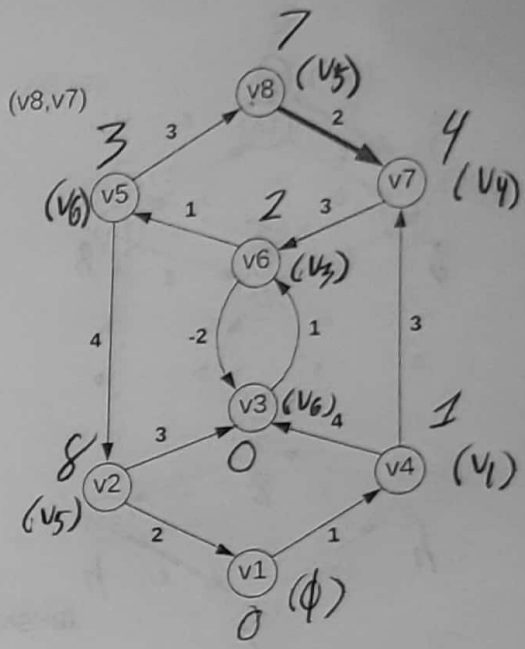




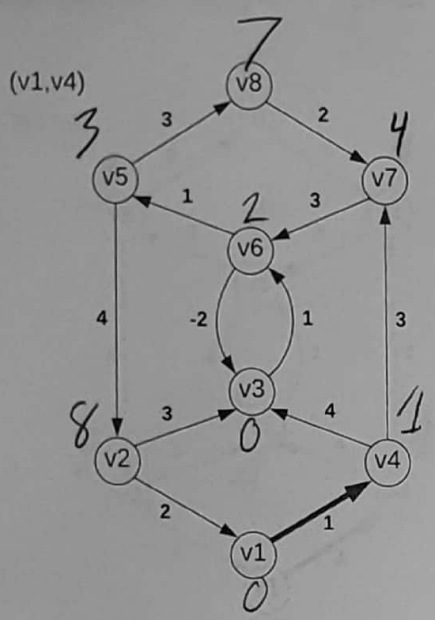

(v6,v3)
v8
v5
v7
v6
v3
v2
v4
v1

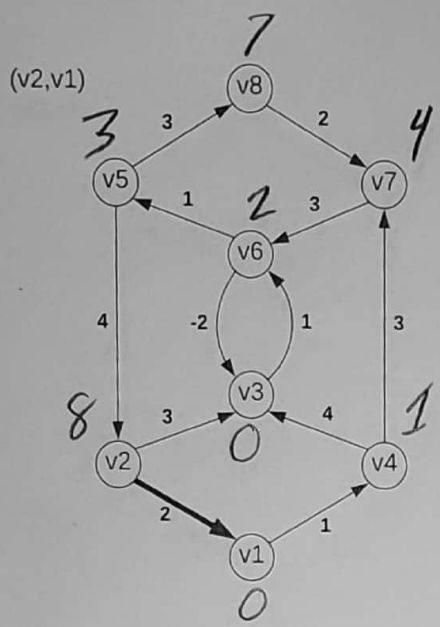

(v6,v5)
v8
v5
v7
v6
v3
v2
v4
v1

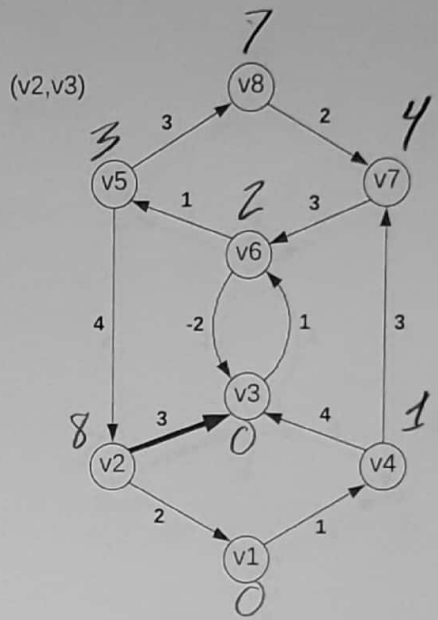

(v7,v6)
v8
v5
v7
v6
v3
v2
v4
v1

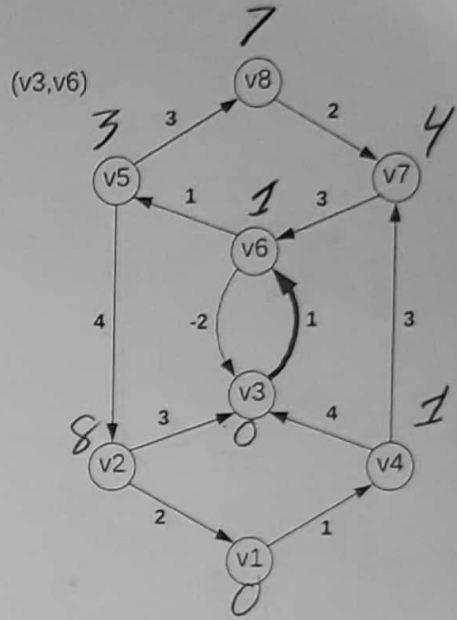

(v8,v7)
v8
v5
v7
v6
v3
v2
v4
v1

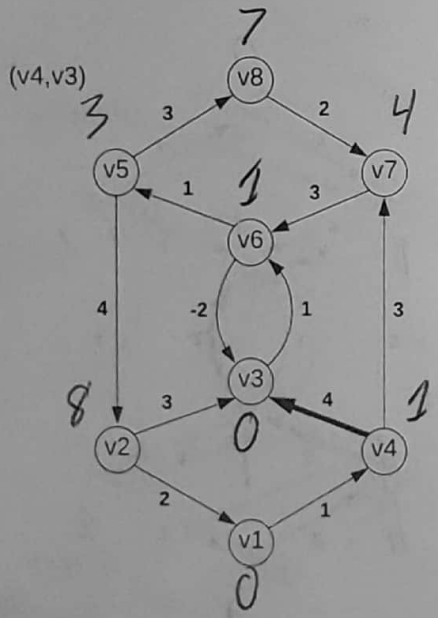
Iteration 7 (k=7)

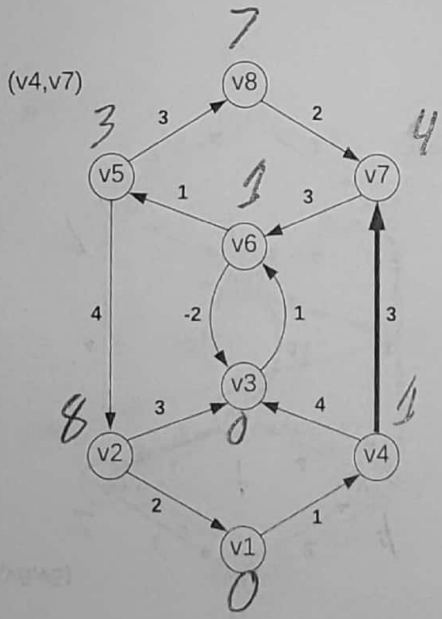


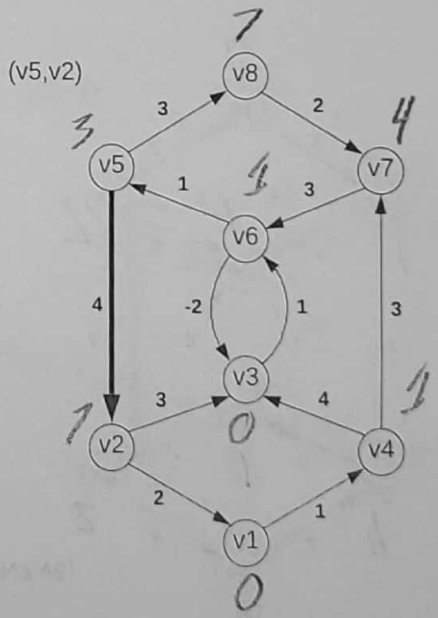


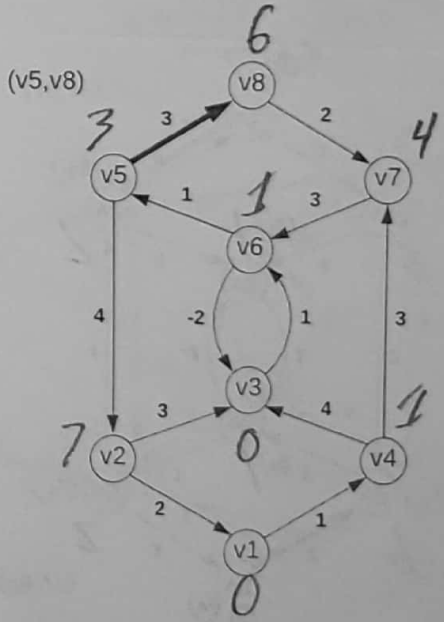




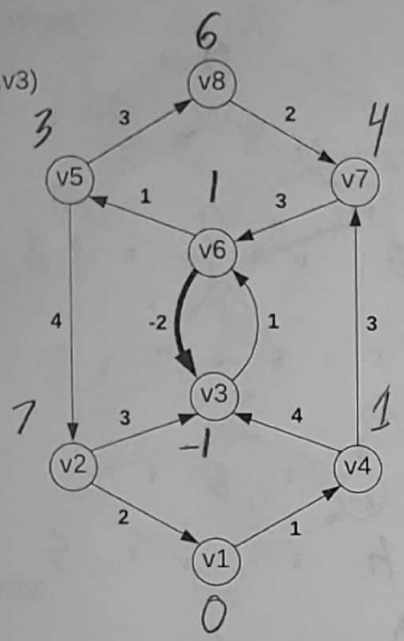




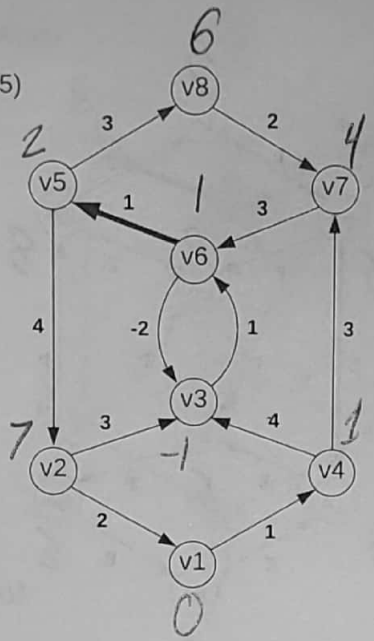




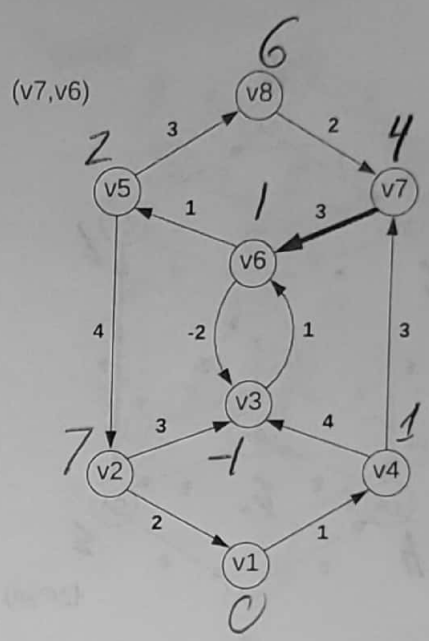
(v6,v3)



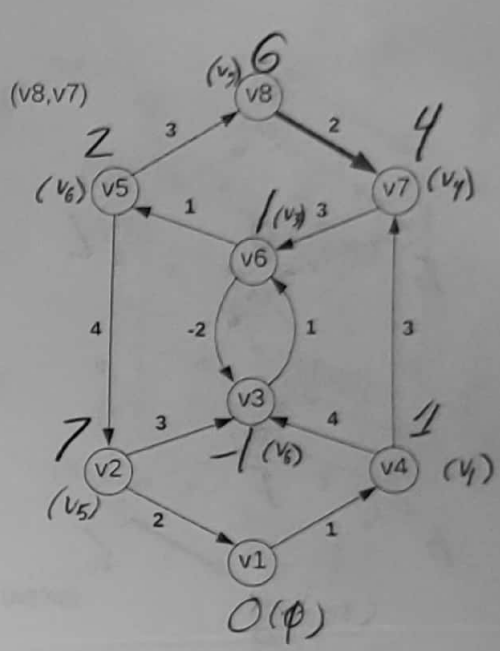
(v6,v5)



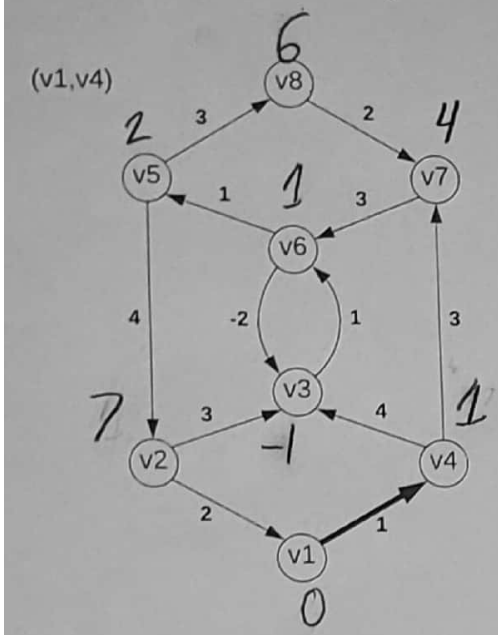
(v7,v6)

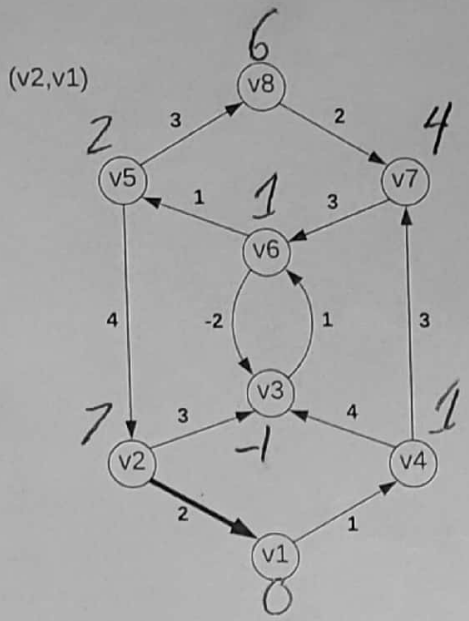


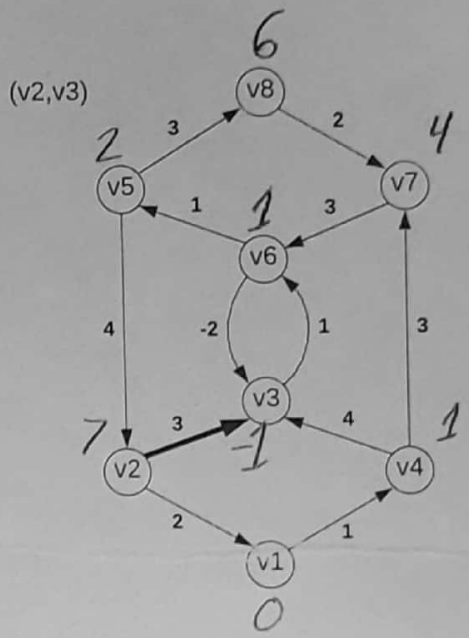
(v8,v7)

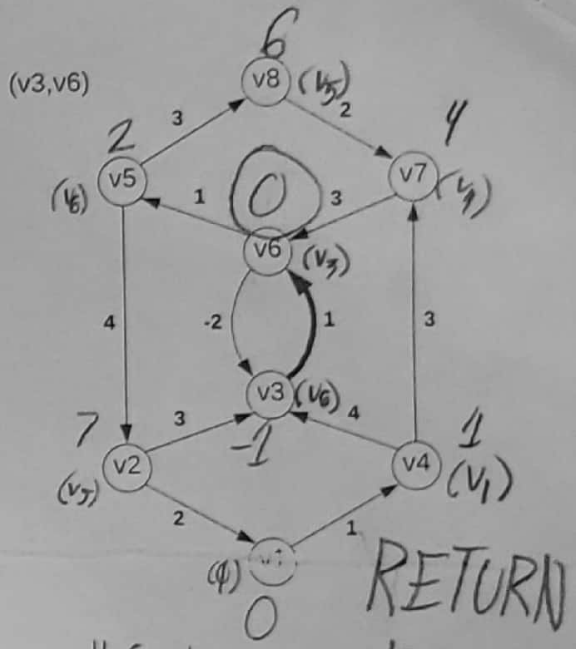


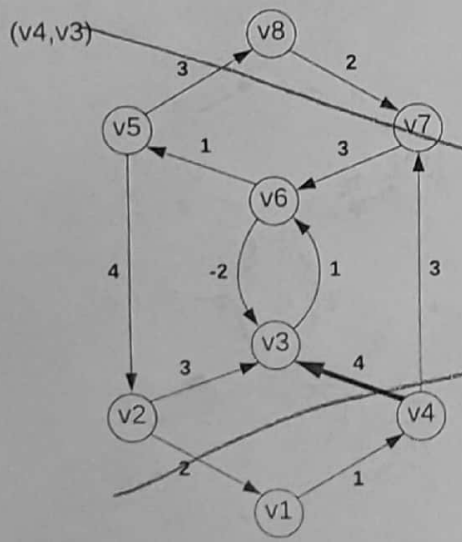
Iteration Check Negative Weight Cycle (k=8)

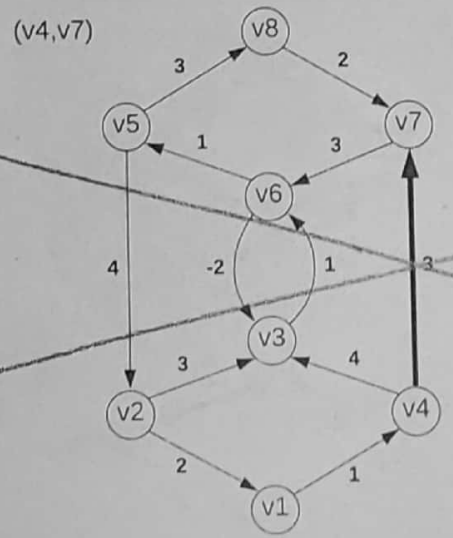


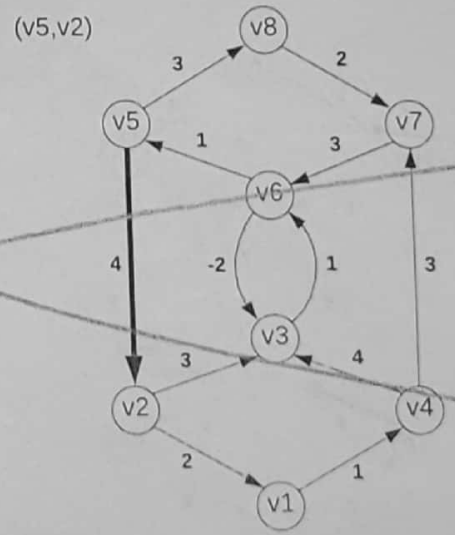


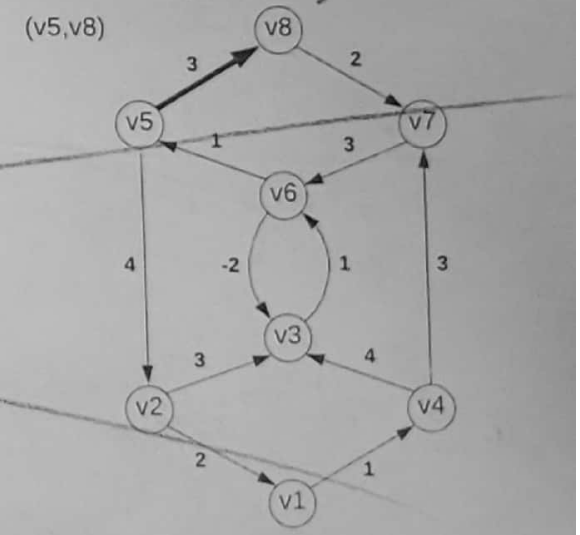




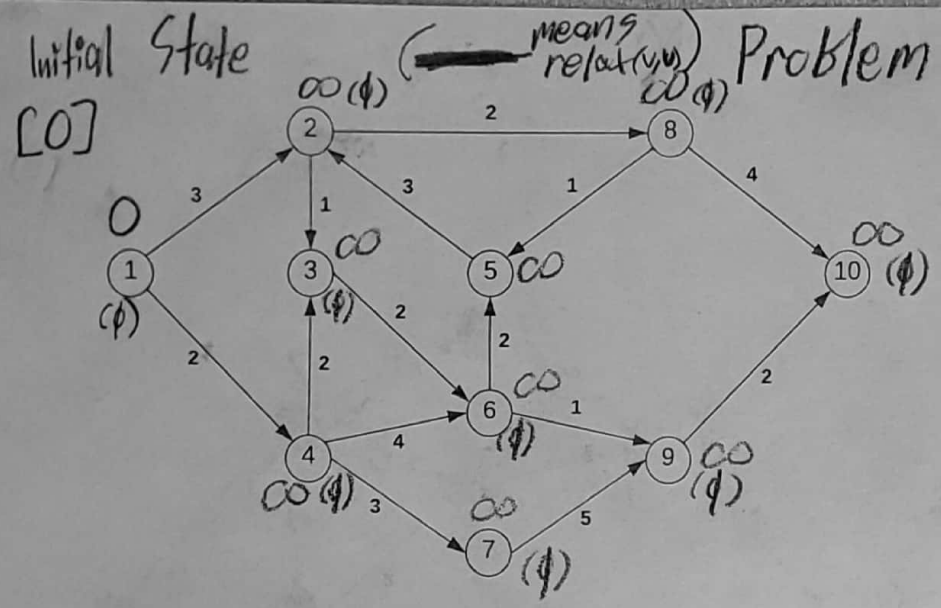


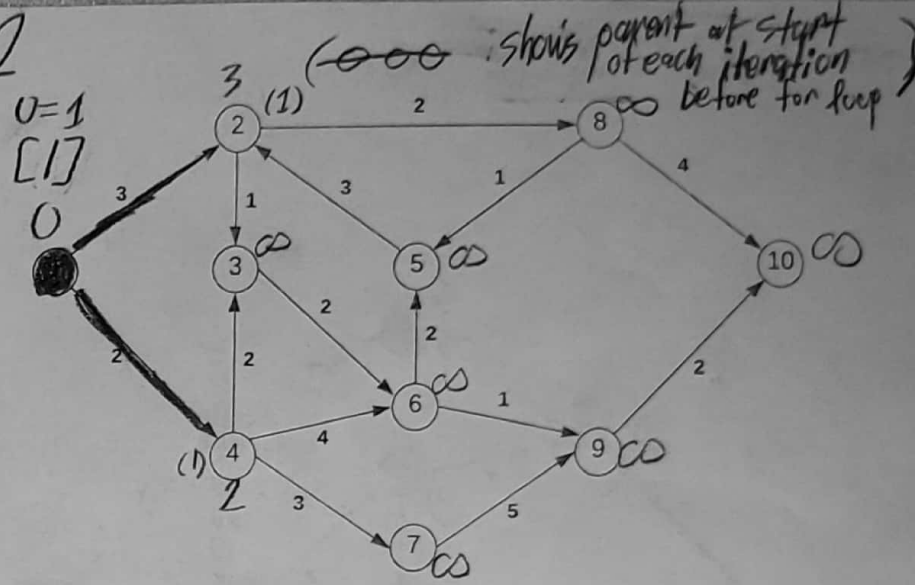


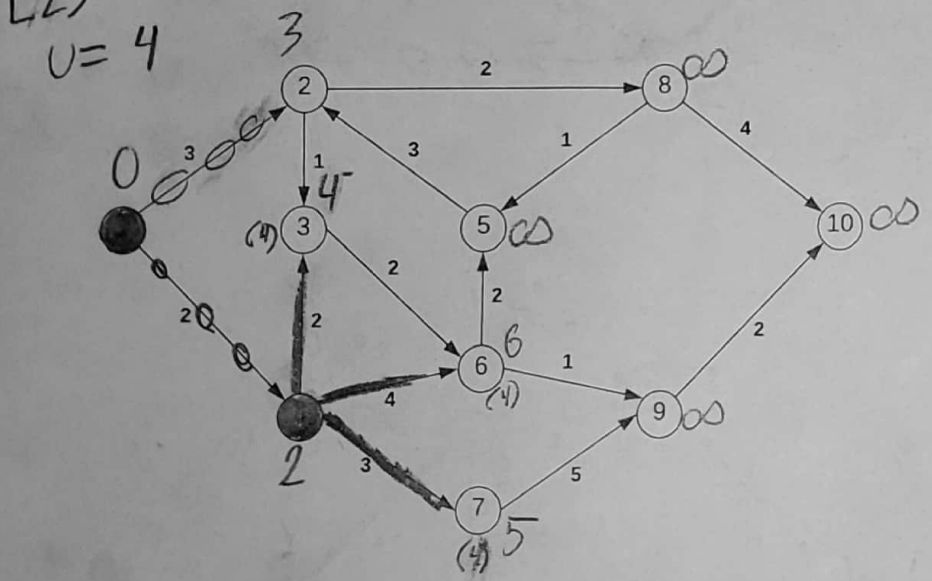


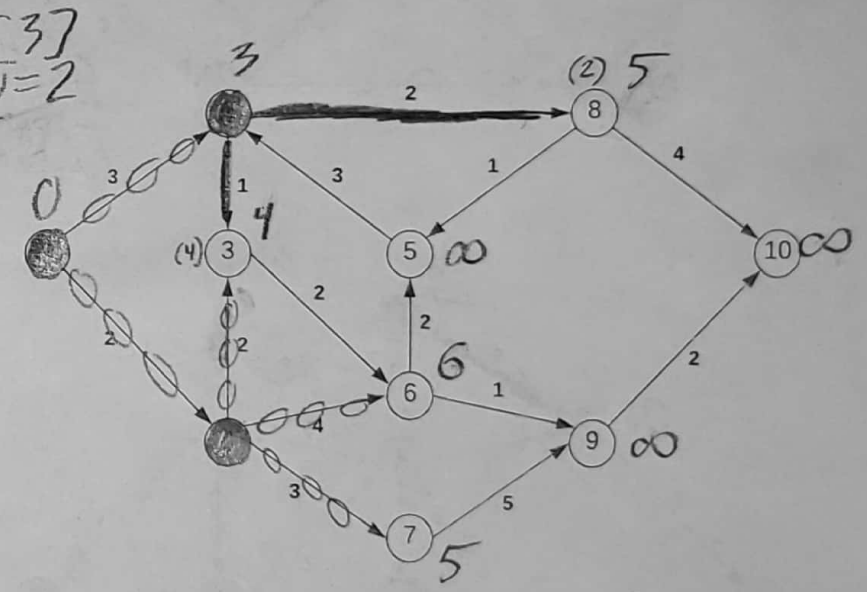


Initial State (—— means relax(u,v)) Problem 2



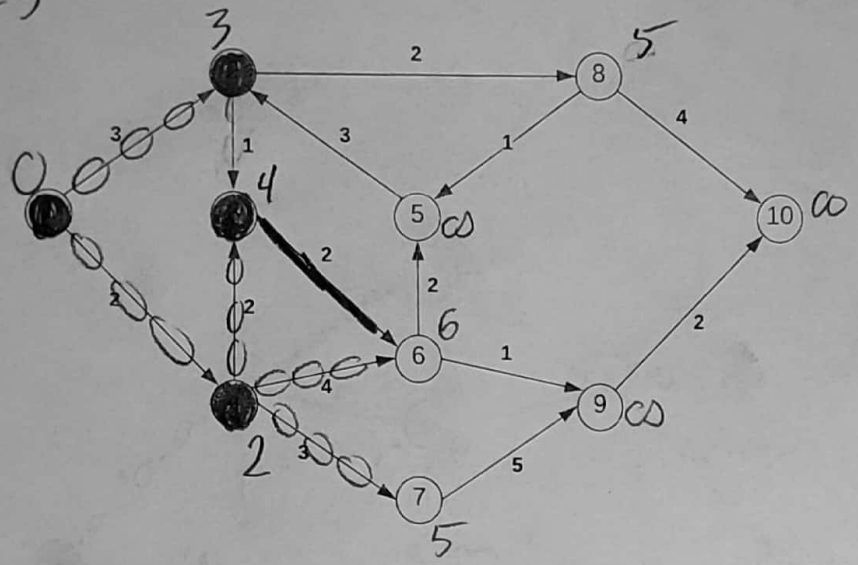






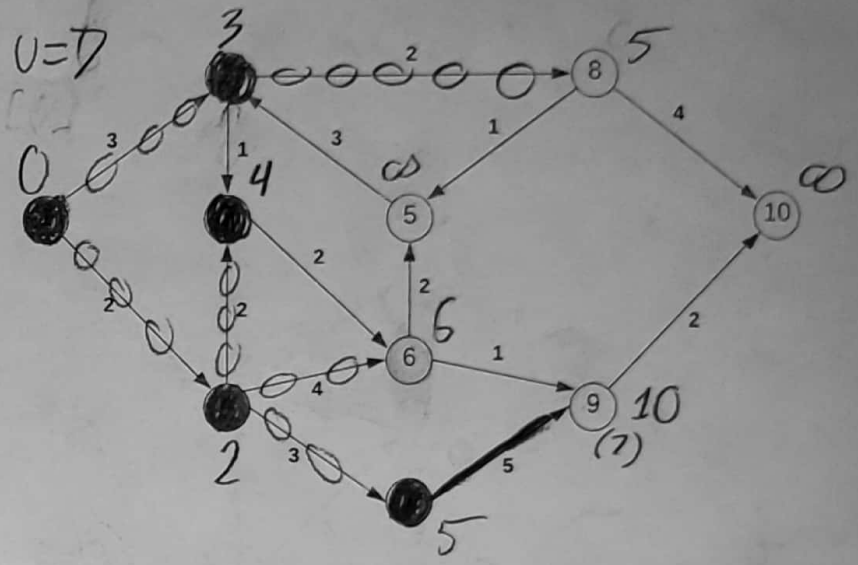
[4]

v=3



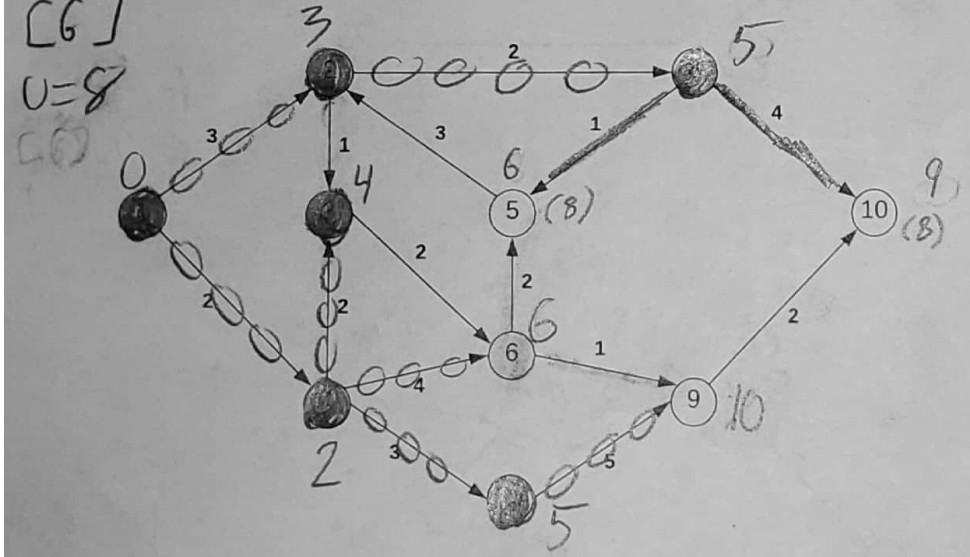
[5]

v=7



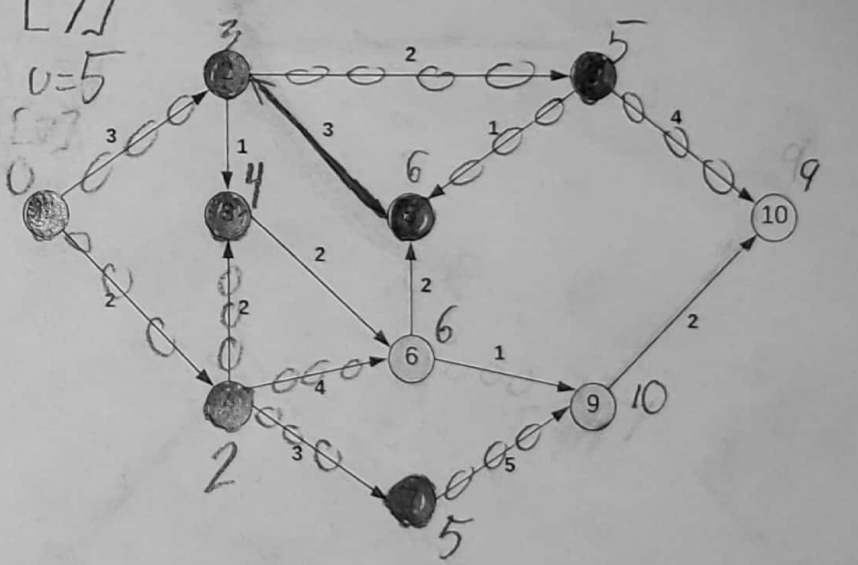
[6]

v=8



[7]

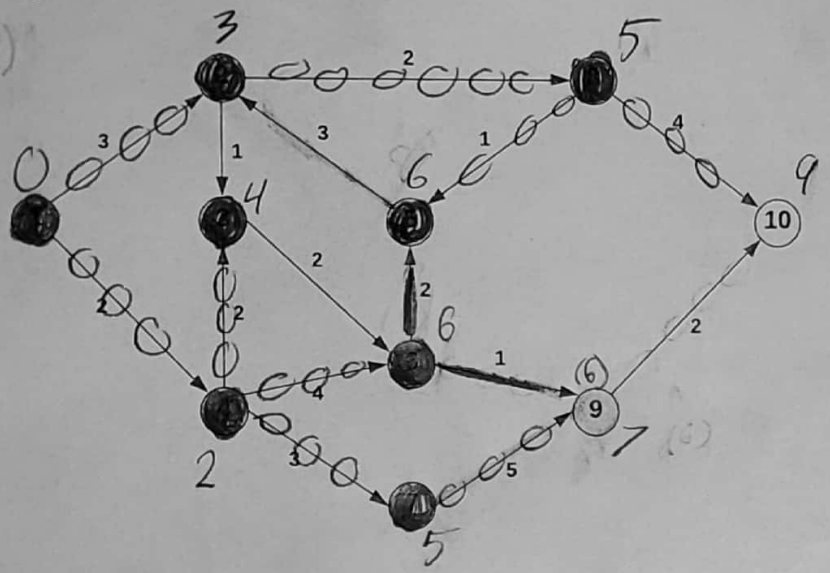
v=5



Problem 2

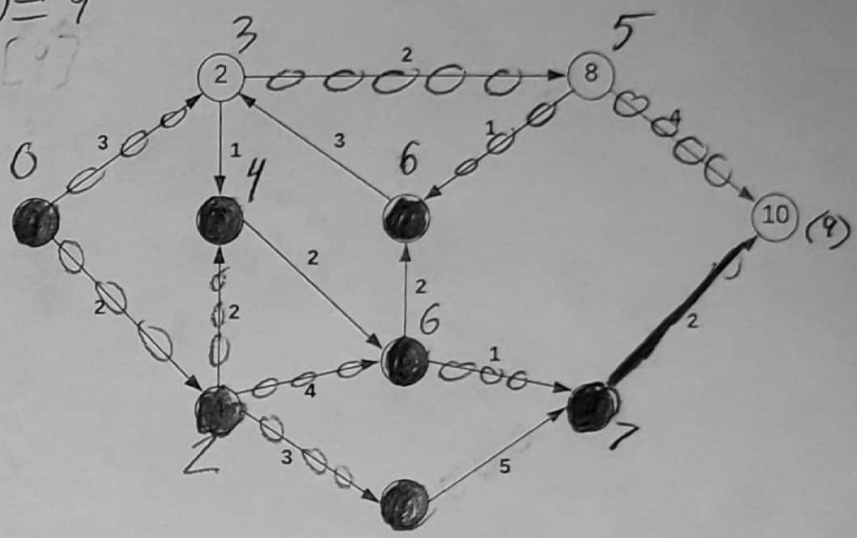
[8]

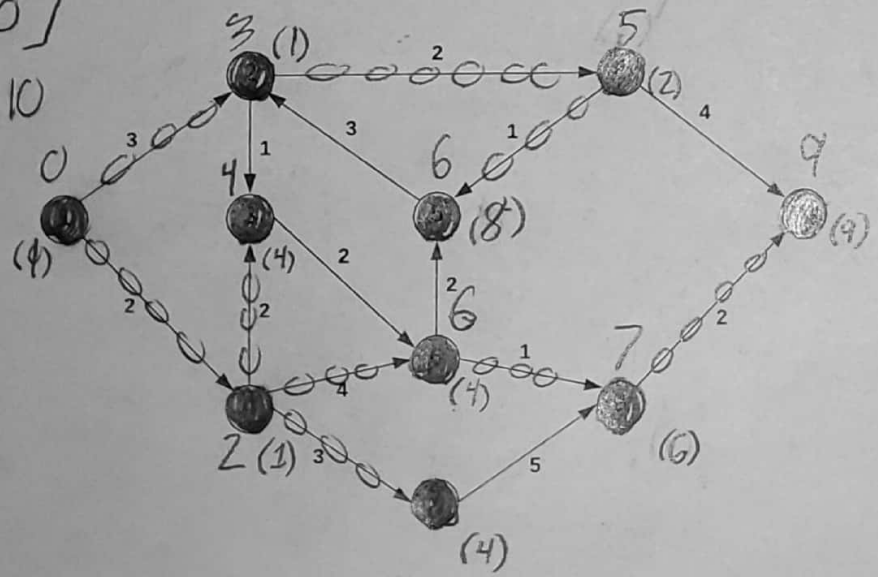
v = 6



[9]

v = 9



[10]

v = 10