

# CS 344 Assignment 6

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**Name :** Yang Bao

**NetID :** yb184

**Section :** 02

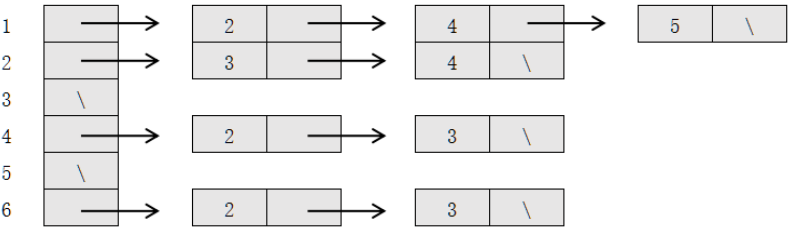
**The classmate I discussed with :** Zitian Qin

Problem 1 :

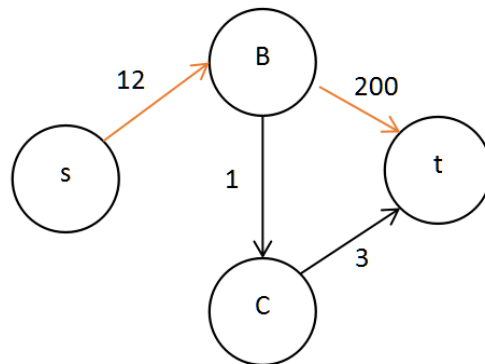
1. Part 1 :

	1	2	3	4	5	6
1	0	1	0	1	1	0
2	0	0	1	1	0	0
3	0	0	0	0	0	0
4	0	1	1	0	0	0
5	0	0	0	0	0	0
6	0	1	1	0	0	0

2. Part 2 :



**Problem 2 :**



The red line is the  $st$  path returned by BFS which is  $12 + 200 = 212$ , longer than the path  $s$ - $B$ - $C$ - $t$  which is  $12 + 1 + 3 = 16$

**Problem 3 :**

The algorithm I use in this question is depending on BFS algorithm, while instead of store the distance, I store the color of that vertex. For every vertex  $w$  of the end of edge  $(v, w)$ , I will check if it has been colored. If not, color it using the opposite color of  $v$  (blue-red). If colored, check if color of  $w$  is the opposite of  $v$ . If is, then it's fine. If not, then there is a conflict from the other vertex that has a edge to  $w$ , so the graph can not be bipartite. So return "no solution" and end the program. If after traverse all the vertexes and there is no return, so the graph is successfully colored and the graph is bipartite. Pseudocode :

1. Mark  $s$
2. set  $\text{color}(s) = \text{"red"};$
3. add  $s$  to queue  $Q$ ;
4. while  $Q$  non-empty :
  - (a)  $v \leftarrow Q.\text{pop}()$
  - (b) For each edge  $(v, w)$ 
    - i. if  $w$  is not marked
      - A. set  $\text{color}(w) = \text{opposite of color}(v);$
      - B. mark  $w$
      - C.  $Q.\text{add}(w);$
    - ii. if  $w$  is marked &&  $\text{color}(w) \neq \text{opposite of color}(v);$ 
      - A. return "no solution"
5. return

Since there are  $|E|$  edges and for each edge, the running time is  $O(1)$ , so the total running time is  $O(|E|)$ .