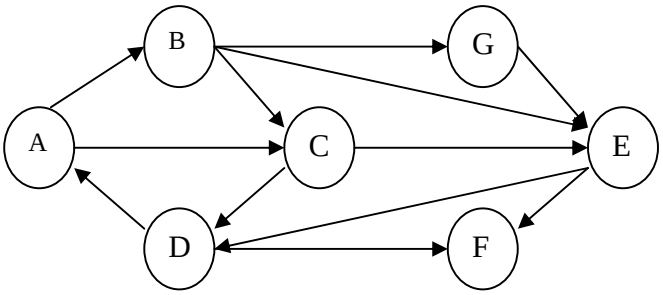
CSE331 homework 6 (Due by the class on Nov. 5th Tuesday)

All the textbook problems are in the 3rd edition. If you don't have the 3rd edition, please borrow your classmates' or mine or TA's.

1. a) Show the in-degree and out-degree for each vertex in the following graph. And, b) using B as the starting vertex, show the BFS tree using the algorithm in our notes. c) Show the DFS tree using B as the source vertex. (a: 5 pts. b: 5 pts. c: 5 pts)



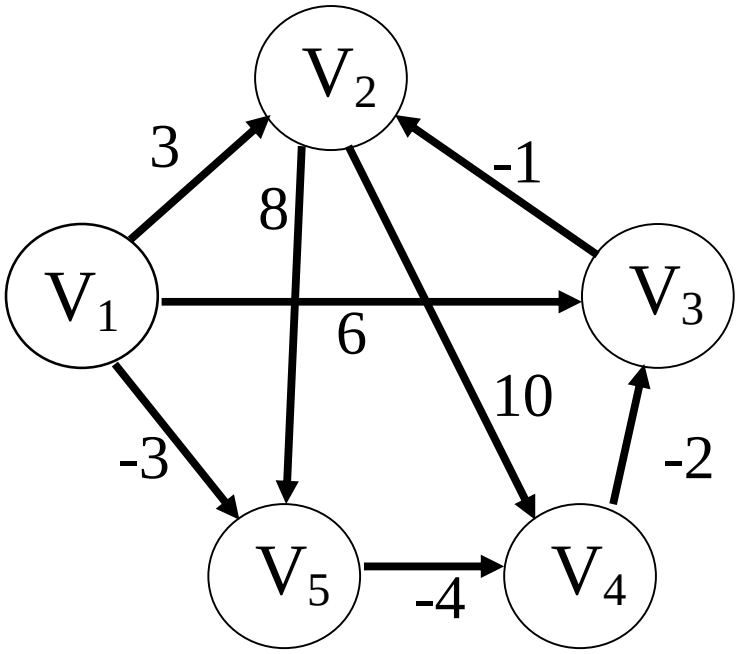
2. Do textbook problem 9.5. Please list each shortest path using the edges in the path. If you choose to draw the paths in the graph, you need to use different colors to differentiate each path. (a. 10 pts, b. 5 pts)

3. Do textbook problem 9.7.a. (only part a). Please draw the graph and explicitly show the wrong path. Since you only need to provide one negative example, feel free to draw this path in the figure. (5 pts)

4. Do textbook problem 9.10.b. (only part b). (10 pts)

5. How can the output of the Floyd-Warshall algorithm be used to detect the presence of a negative-weight cycle? A negative-cycle is a cycle with total weight being less than zero. For example, A→B→C→A is a cycle. If the total weight of A→B, B→C, and C→A is negative, this is a negative-weight cycle. (5 pts)

6. Using Warshall's algorithm to find all-pairs shortest path in the following graph (on page 2).
   a) Show the matrix D and P for each k. (see the pseudo-code in the lecture notes). For k from 0 to 5, you only need to show matrix cells with changes. (10 pts)
   b) Show the final all-pairs shortest paths. Describe each path using edges in them. For example, you could describe a path from V1 to V2 as V1→V3→V2 (5 pts)


V2
3
8
-1
V1
V3
6
10
-3
-2
V5
-4
V4