

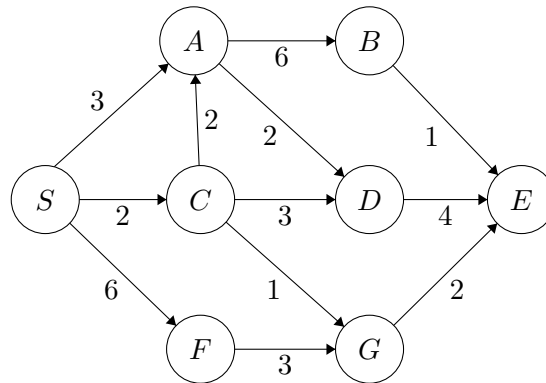
# CS140 - Group Assignment 9

Due: Friday, April 7 at 8pm



1. Discuss any of these problems (or any of the graph algorithms we've covered so far).

(a) Consider the following weighted, directed graph:



- Is this a DAG (directed acyclic graph)?
  - If you run a BFS starting from vertex C in what order do you visit the vertices? Assume adjacent vertices are returned in alphabetical order, i.e., would be added to the queue in alphabetical order.
  - If you run Dijkstra's algorithm with source vertex  $s$ , what is the order in which vertices are removed from the priority queue? Break ties alphabetically.
- (b) If we modify Bellman-Ford so that it updates  $d[v]$  if  $d[v] \geq d[u] + w(u, v)$  (instead of if  $d[v] > d[u] + w(u, v)$ ), does it still produce correct shortest-path weights? Explain.

- (c) Assume you (1) have a weighted, directed graph  $G$  where all the weights are integers between 1 and  $W$  and (2) have an implementation of a min-priority queue that supports extract-min and decrease-key in time  $O(\log \log k)$  assuming all the values are integers between 1 and  $k$ .
  - i. What is the running time of Prim's on this graph with this data structure? Explain.
  - ii. What is the running time of Kruskal's on this graph if you use a linear-time sort based on the additional information about the weights? Explain.
- 2. We're almost 2/3rds of the way through the course.
  - (a) What has been the most challenging thing about this course?
  - (b) Are there any topics that you hope we'll cover in the remaining part of the course?
- 3. Was everyone in the group at the meeting and, if not, who was missing?