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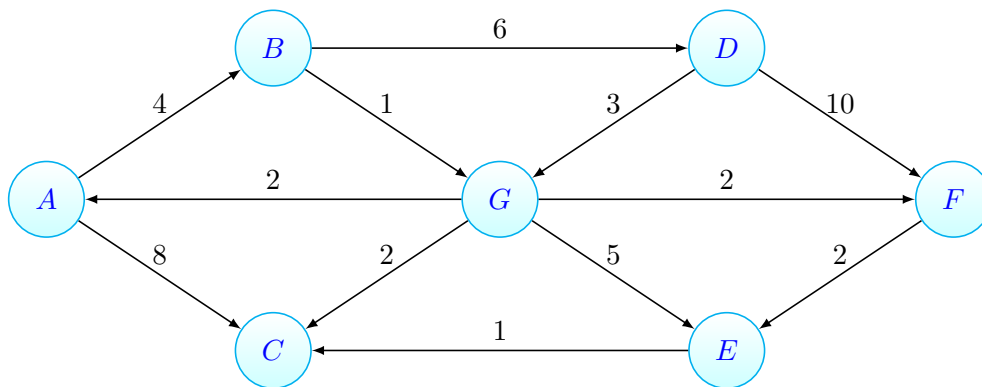
ID:

CSCI 3104, Algorithms
Quiz 6

Profs. Chen & Grochow
Spring 2020, CU-Boulder

Instructions: This quiz is open book and open note, but **not** open-internet. You **may** post clarification questions to Piazza, with the understanding that you may not receive an answer in time and posting does count towards your 30 minutes. Questions posted to Piazza **must be posted as PRIVATE QUESTIONS**. Other use of the internet, including searching for answers or posting to sites like Chegg, is strictly prohibited. Any violation of the honor code is grounds to receive a 0 on this quiz. Proofs should be written in **complete sentences**. **Show and justify all work to receive full credit.**

Standard 15. Consider the following directed, weighted graph G . At the first iteration of Dijkstra's Algorithm, using A as the source vertex, we examine both the (A, B) and (A, C) edges by placing them into a priority queue. However, only (A, B) is selected at the first iteration.



What are the next five edges **selected** by Dijkstra's algorithm? After these have been selected, what are the distances from A that the algorithm has recorded for each vertex in G ?

As the problem described, the A is the source vertex, and the edge is the first (A, B) is the first edge being selected. After that, the edge (A, C) will be the second edge being selected. Then the cost from A to B is 4, A to C is 8. Then edges (B, D) and (B, G) will be selected, the distance from A to D will be updated by 10 with previous vertex B , and A to G is 5 with previous vertex B . Because we implement the algorithms through priority queue, the next vertex we select will be D with initial distance 10, the next edge is (G, F) , then from A to F the distance updated from infinity to 7 with previous vertex G . Then we found the edge (G, E) , the distance from A to E will be updated from infinity to 9 with previous edge G .

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Order of Edges: (A, B), (A, C), (B, G), (B, D), (G, F), (G, E)

Distance from A to G is 5, we go through edges (A, B) and (B, G)