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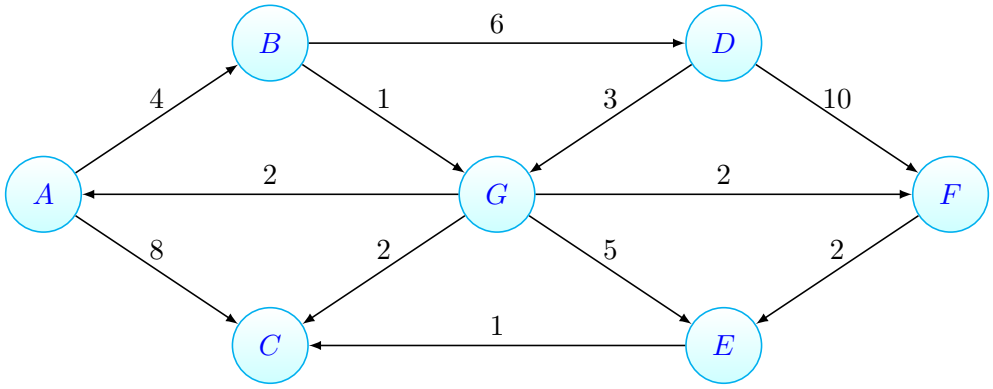
CSCI 3104, Algorithms **Profs. Chen & Grochow**
Quiz 6 **Spring 2020, CU-Boulder**

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 Dijksrta'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?

In the first iteration of Dijkstra's Algorithm, using A as the source vertex, it will select (A, B). After that, it will select (A, C) as second edge because of the cost for (A, B) being 4 and the cost for (A, C) being 8. Next, edges (B, D) and (B, G) will be selected. The cost for A to B to D is 10 and the cost for A to B to G is 5. The next vertex will be D (10) because of the implementation of the algorithms in priority queue. The next edge will be (G, F). The distance from A to F updates from infinity to 7 with previous vertex G. After that we found the edge (G, E). This will also update the distance from A to E infinity to 9 with previous vertex G.

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The order of edges is $(A, B), (A, C), (B, G), (B, D), (G, F), (G, E)$

The distance from A to G is 5, and we go through edges (A, B) first and (B, G).