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CSCI 3104, Algorithms **Profs. Chen & Grochow**
**Exam 2 − S13** **Spring 2020, CU-Boulder**

Instructions: This quiz is open book and open note. 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 time limit (30 min for 1x, 37.5 min for 1.5x, 45 min for 2x). 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. Violations of these are grounds to receive a 0 on this quiz. Proofs should be written in **complete sentences. Show and justify all work to receive full credit.**

YOU MUST SIGN THE HONOR PLEDGE. Your quiz will otherwise not be graded. Honor Pledge: On my honor, I have not used any outside resources (other than my notes and book), nor have I given any help to anyone completing this assignment.

Your Name: Daniel Kim _____

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Standard 13. Consider the following graph G.
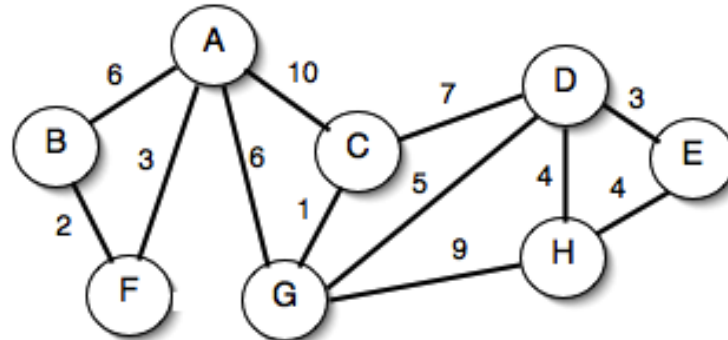
We seek to construct a minimum spanning tree from G, using **Kruskal's Algorithm.** Determine the first six edges selected to be included in the MST. Clearly articulate the steps Kruskal's Algorithm takes to select these edges.

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Using Kruskal's Algorithm, we need to add an edge with smallest weight to the MST and evaluate the edges in ascending order while avoiding to create a cycle.

To begin, we need to add the smallest edge which is (C, G) with weight 1. The next smallest edge is (B, F) with weight 2 so we add that edge after that. For the next edge, since there are two edges with the weight 3, we will pick a random edge (A, F) and then pick the remaining edge with weight 3 which is (D, E). We face the same situation for the next smallest edge, there are two edges with weight 4. However, this time we will pick one because if we pick both edges again, it will create a cycle. So we will pick one edge (H, E) with weight 4. After that, the next smallest edge will be (D, G) with weight 5 and adding that edge will conclude the problem.

Therefore, the order is $(C, G) \rightarrow (B, F) \rightarrow (A, F) \rightarrow (D, E) \rightarrow (H, E) \rightarrow (D, G)$