CSE 4310 – Homework3
Due Thursday, 11/12/2020, 11:59 pm

- **Skills & Knowledge:** The purpose of this assignment is to help you practice the following skills that are essential to your success in this course in your major and professional work behind the school.
    - Greedy Algorithm
    - Shortest Path Algorithm
    - Lateness algorithm, interval scheduling algorithms

- **Deliverables:** Turn in your solution through Blackboard in Softcopy (neat handwritten scanned, or using Word, LaTeX, or any other tool, and then convert into PDF).

P1) (20 pts) [**Greedy Algorithm**] Professor M. has always dreamed of inline skating across North Dakota. He plans to cross the state on highway U.S. 2, which runs from Grand Forks, on the eastern border with Minnesota, ton Williston, near the western border with Montana. The professor can carry two liters of water, and he can skate ***m*** miles before running out of water. (Because North Dakota is relatively flat, the professor does not have to worry about drinking water at a greater rate on uphill sections than on flat or downhill sections.) The professor will start in Grand Forks with two full liters of water. His official North Dakota state map shows all the places along U.S. 2 at which he can refill his water and the distances between these locations. The professor's goal is to minimize the number of water stops along his route across the state. Give an **efficient method** by which he can determine which water stops he should make.

P2) (20 pts) [**Dijkstra]** Run Dijkstra's algorithm on this graph starting from vertex 1.

a. What are the final costs of each vertex and the shortest paths from 1 to each vertex?
b. Use the concept of predecessor we discussed in class to draw the shortest path from node 1 to node 7.

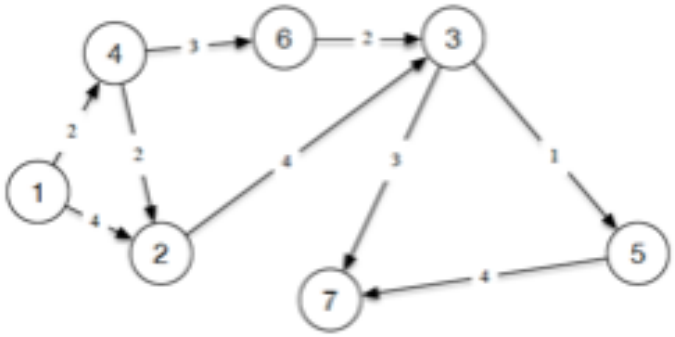

Figure 1 Graph for shortest path

P3) (10 pts) [**Interval Scheduling]** Run Given a set of activities with a start time and finish time, we want to select the largest number of nonoverlapping activities. Explain your approach and write down the optimal set of activities.

Activity	1	2	3	4	5	6	7	8	9	10
Start Time	1	1	2	4	5	8	9	11	12	13
Finish Time	3	8	5	7	9	10	11	14	17	16