INP ENSEEIHT

1er année Informatique et Réseaux
Théorie des graphes
31/01/2019 – durée 1h30m
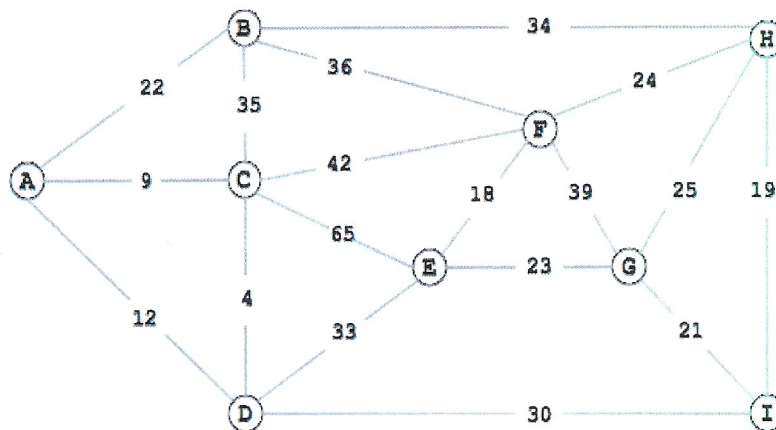Gentian JAKLLARI

Q1. Run Prim's algorithm on the weighted graph below. Show the set A (spanning tree) after each iteration of the for loop

Q2. Apply the stable marriage algorithm on the "ranking matrix" below. A, B, C, D are doing the "serenading".

	A	B	C	D
α	1,3	4,1	3,1	2,3
β	1,4	2,3	3,2	4,4
γ	3,1	1,4	2,3	4,2
δ	2,2	3,2	1,4	4,1

Q3. The diameter of a graph G (V,E) is defined as the largest of all shortest-path distances in the graph. Give an efficient algorithm to compute the diameter of a graph, and analyze the running time of your algorithm.

Q4. Given an example of a weighted graph where Dijkstra's algorithm will fail to find the shortest path while Bellman-For will succeed.

Q5. In a basketball tournament every team plays every other team and each match lasts one hour. Determine the minimum duration of a tournament with 3,4,5, or 6 teams, respectively. Assume that you have as many basketball courts as possible.

Q6. Prove by induction that any tree T on n vertices has exactly (n-1) edges.