Design and Analysis of Algorithms (18 Spring)

Assignment 2

Due: Apr. 26, 2018

1. (10 points) Please write down the main steps of proving the NP-Completeness of a problem.

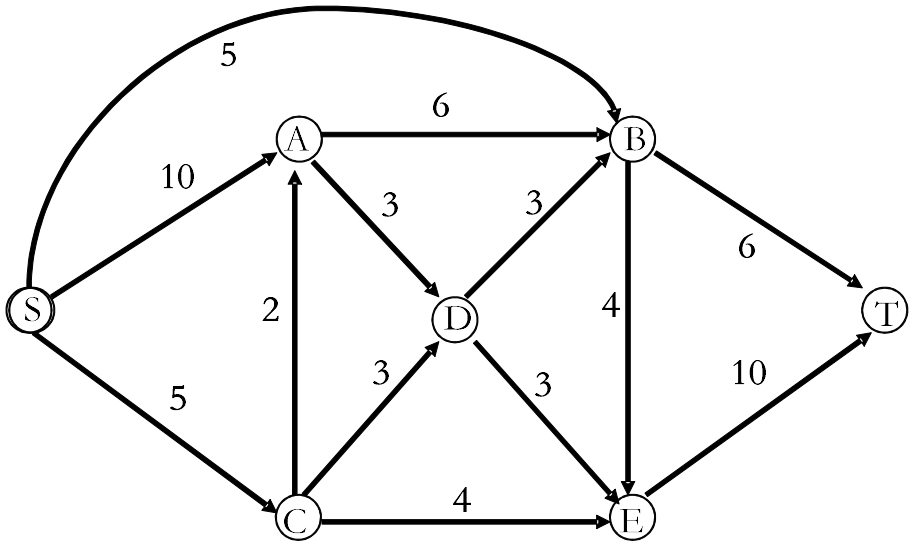
2. (30 points) A graph is an s-club if for any two vertices in the graph there is a path of length at most s edges between them. The 2-club problem is to ask whether a given graph has a 2-club of size at most k.

   2.1 Prove that the 2-club problem is in NP.

   2.2 Prove that the 2-club problem is NP-hard.

3. (20 points) Prove that: if we can check whether a graph has a Hamilton cycle in polynomial time then we can also find a Hamilton cycle in a graph in polynomial time.

4. (20 points) Compute a maximum flow from S to T in the following graph.



5. (20 points) 谈谈本课程中你觉得最难的知识点是哪里，说一下主要难理解的地方和原因，如果感觉课程内容都容易理解则可以谈一谈你收获最大的地方或者一个你应用算法课程知识的地方。（用中文回答，若该题出现雷同，无论是抄袭者还是被抄袭者均可能被判为零分）