

It is very similar to the former Ruby's exam. Here are some questions I remembered:

1. Give the template of DFS: find the maximum edge in each connected component of a graph. For example if the graph has 3 connected components, you should return a sequence contains three edges, each edge is the maximum weight edge in that component.
2. Also DFS: return a sequence of vertices of the connected component that has the largest number of vertices. So you have a G that contains many component we need to return the vertices of the component that has largest number of vertices using DFS template.
3. Analyze the time of DFS and above two problems.
4. Dynamic programming: same as the previous exam (binomial coefficient)
5. NP and NPC (Same question as previous exam but with different problems, here TSP and HC):
  - Prove that the TSP is NP.
  - Given that HC (Hamiltonian cycle) is NPC, reduce HC to TCP
  - What can you conclude about TSP from above two questions
  - 10 T/F same as previous exam
6. Analyze the time of a given algorithm (same as the previous exams)
7. If you have graph G that has spanning tree T, and then we increase all edge weights of G by 1 (all edges including the edges in T), is T still spanning tree after this increasing? Justify.
8. If you have graph G, and shortest path T, and then we increase all edge weights of G by 1 (all edges including the edges in T), is T still shortest path after this increasing? Justify.
9. What is a minimum spanning