Reading Quiz #11

ⓘ This is a preview of the published version of the quiz

Started: Nov 18 at 8:11p.m.

Quiz Instructions

To prepare for this quiz, please read the following sections of the Kleinberg + Tardos textbook:

- Section 8.10
- One of sections 8.7, 8.8

The goal of this quiz is to lightly assess a first quick reading of these resources to prepare for class. You should definitely return to this material for a more thorough read to solidify your learning and prepare for assignments and exams.

Answer question 1, and either questions 2 and 3, or questions 4 and 5. The quiz will be graded out of 3 (although canvas does not know about this and will claim it is out of 5).

Question 1 — 1 pts

Which of the following problems are known to be NP-complete? Choose all that apply.

- [ ] Independent Set
- [ ] Set Packing
- [ ] Vertex Cover
- [ ] Weighted Interval Scheduling Problem
- [ ] Traveling Salesman
- [ ] Longest Common Subsequence
- [ ] Stable Marriage Problem

Question 2 — 1 pts

Select every **true** statement about graph k-coloring.

- [ ] The problem can be solved in polynomial time for some values of k
- [ ] There is a relatively straightforward proof that every map is 4-colorable
- [ ] Graph coloring has applications in compiler design.
- [ ] We can prove that the Graph 17-Coloring problem is NP-complete using a reduction from Graph 3-Coloring problem.

Question 3 — 1 pts

Select every **true** statement about the reduction to prove the graph k-coloring is NP-complete described in the textbook.

- [ ] The purpose of the vertex labeled B is to ensure that only two colors are used for the vertices labeled with variable names.
- [ ] Every variable in the 3SAT instance is represented by two vertices in the graph constructed by the reduction.
- [ ] Every clause in the 3SAT instance is represented by 5 vertices in the graph constructed by the reduction.
- [ ] In order to obtain a valid reduction, we must use the subgraph shown in Figure 8.12 to represent the clause $v_1 \vee \overline{v_2} \vee v_3$ (no other subgraph will yield a valid reduction).

Question 4 — 1 pts

Select every **true** statement about the Subset Sum problem. We will use *3DM* to refer to the 3-dimensional matching problem.

- [ ] There is an algorithm for the Subset Sum problem that runs in θ(nW) time, which is polynomial in the size of the input to the problem.
- [ ] There are scheduling problems that can be proved NP-complete using a reduction from Subset Sum.
- [ ] The Subset Sum problem is NP-complete, independently of any restrictions of the value of W.
- [ ] Adding two integer values w_1 and w_2 takes time in $\Theta(w_1 + w_2)$.

Question 5 — 1 pts

Select every **true** statement about the reduction to prove the Subset Sum problem is NP-complete.

- [ ] Numbers in the instance of Subset Sum generated by the reduction are written in base m+1, where m is the number of triplets in the instance of 3DM.
- [ ] Each triplet in the instance of 3DM is represented by a 3n digits integer in the instance of Subset Sum generated by the reduction, where n is the size of the sets if the instance of 3DM.
- [ ] Only one of the digits in the number used to represent a triplet in the 3DM instance is 1.
- [ ] The construction of the instance of Subset Sum ensures the addition will not produce carries.

Not saved Submit Quiz