Reading Quiz #9

This is a preview of the published version of the quiz

Started: Nov 1 at 2:38p.m.

Quiz Instructions

Read the following chapters from the textbook:

- Chapter 8, sections 8.1 up to but not including "A First Reduction..." on page 454.
- Chapter 8.3.
- Chapter 8.4 (only theorems (8.12), (8.14) and the section titled "General Strategy for Proving New Problems NP-Complete")

Question 1 — 1 pts

Section 8.1: Polynomial-Time Reductions

Which of the following are true?

- [ ] "Problem Y is polynomial-time reducible to problem X" is equivalent to "problem X is at least as hard as problem Y with respect to polynomial time".
- [ ] Assume problem Y is polynomial-time reducible to problem X. If X can be solved in polynomial time, Y can be solved in polynomial time.
- [ ] Assume problem Y is polynomial-time reducible to problem X. If X cannot be solved in polynomial time, Y cannot be solved in polynomial time.
- [ ] Assume problem Y is polynomial-time reducible to problem X. If Y cannot be solved in polynomial time, X may be solved in polynomial time.
- [ ] Let $G = (V, E)$ be a graph. S is an independent set if and only if $V - S$ is a vertex cover.

Question 2 — 1 pts

Which of these would make a good "certificate" for a certifier for 3-SAT?

- ○ A list of truth assignments to each variable in the problem.
- ○ A list of the clauses in the problem that can possibly be satisfied via any assignment of truth values to variables.
- ○ A list of the 2^n possible truth assignments to all n variables in the problem.

Question 3 — 1 pts

Which of the following are true?

- ☐ There is a fair amount of hard evidence showing that $\mathscr{P}$ is most likely not equal to $\mathscr{NP}$.
- ☐ If a problem belongs to $\mathscr{NP}$ then every Yes instance of this problem admits an efficient verifier.
- ☐ If a problem belongs to $\mathscr{NP}$ then every No instance of this problem admits an efficient verifier.
- ☐ Many theoretical computer scientists believe that no problem in $\mathscr{NP}$ can be solved in polynomial time.
- ☐ Every problem in the class $\mathscr{NP}$ can be solved in time $O(2^{f(n)})$ where f is a polynomial function of the instance size n.

Question 4 — 1 pts

When proving a new problem A to be NP-complete via reduction, which of the following must we do?

- Reduce a known NP-complete problem B to A and show that A is in NP
- Reduce A to a known NP-complete problem B and show that A is in NP
- Reduce A to a known NP-complete problem B and show that B is in NP.
- Reduce a known NP-complete problem B to A and show that B is in NP.

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