

CIS507: Design & Analysis of Algorithms
Quiz 6, Spring 2012

Duration: 20 minutes
Total weight: 5%

Student Name: - - - - -

Student ID: - - - - -

Problem	Points Obtained	Points Possible
1		1
2		4
Total		5

Cheat list:

P: problems for which a polynomial time algorithm exists.

NP: problems which are polynomial time verifiable.

CoNP: problems which are complements of problems in *NP*.

NP – Hard: problems to which every problem in *NP* can be reduced in polynomial time.

CoNP – Hard: problems which are complements of *NP – Hard* problems.

NP – Complete = $NP \cap NP - Hard$

CoNP – Complete: problems which are complements of *NP – Complete* problems. Equivalently: problems in *CoNP* to which every problem in *CoNP* can be reduced in polynomial time.

1 True/False (1 point)

1. **(0.5 point)** Suppose there exists a *coNP – complete* problem *L* that is also in *NP*. Then $coNP \subseteq NP$.
2. **(0.5 point)** Suppose there exists a *coNP – complete* problem *L* that is also in *NP*. Then $NP \subseteq coNP$.

2 Multiple Choice (4 points)

For each of the following, circle all (zero or more) correct answer(s). You will be penalized 0.25 points on each wrong choice.

1. **(1 point)** 3-SAT is:
(a) P (b) NP (c) CoNP
(d) NP-Hard (e) coNP-Hard (f) NP-Complete
2. **(1 point)** Consider the problem of determining, for a given boolean formula, whether every assignment to the variables satisfies it. The problem is:
(a) EXP (b) NP (c) CoNP
(d) NP-Hard (e) coNP-Hard (f) CoNP-Complete
3. **(1 point)** Showing a polynomial time reduction from 3-SAT to problem X proves that X is:
(a) P (b) NP (c) NP-Complete (d) NP-Hard
4. **(1 point)** If X is NP-Complete, this implies that X is:
(a) NP (b) EXP (c) P (d) NP-Hard