CS4102, Algorithms   **Name:**
Assessment Self-Quiz on NP-complete Lectures:

Answer the questions below while listening to the lecture. At the end of class, turn in this paper to get some class-participation credit. The results you give will not count toward your grade in the class. The purpose of this test is for me to get a feel for how well the class overall understands this material, **and** for **you** to see how well you understand this material. We'll make these questions and answers available to you later.

1) Are *intractable problems* impossible to solve?

2) Which are true statements about NP-complete problems?
   a) No one has been able to solve them.
   b) We know they have exponential time-complexity, i.e. it is impossible to solve them in polynomial time.
   c) We have proved a lower-bound for these problems that is polynomial.

3) Besides the Hamilton cycle problem, name two other NP-complete problems.

4) True or false? Assigning colors to vertices in a graph using the smallest number of colors is an example of a *decision problem*.

5) True or false? Determining if a value n is a prime number has complexity $\Theta(n)$.

6) For problem P, if we are given an input I and a possible answer A, and we find a way to verify whether or not A really is a valid answer to P given I, then what kind of problem is P? Choose from: P, NP, NP-hard, or NP-complete

7) Would you like to have a non-deterministic grader for your CS432 exams and home-works? Why or why not?

8) If A and B are problems that belong to NP-c, then
   a. Does A $\leq_P$ B? yes or no
   b. Does B $\leq_P$ A? yes or no

9) How would you use the idea of reducability to prove that problem A is NP-c, if you know that:
   a. Problem B is NP-c
   b. Problem C is NP
   c. Problem D is P
   Write down which of these 3 pieces of information might be useful in showing that A is NP-c:
       circle each that apply   (a)   (b)   (c)
   Also, write down what you need to show reduces to what:

10) If you know that A $\leq_P$ B and that B could be solved in polynomial time, what could you say about the tractability of A?
   a. Can you say it's tractable? If so, think about why?
   b. Can you say it's not tractable? If so, think about why?