CS 173: Discrete Structures, Spring 2010
Quiz 1 (Wednesday 10 February)

NAME:

NETID:

This quiz has 2 pages containing 6 questions, totalling 20 points. You have 20 minutes to finish. Showing your work may increase partial credit in case of mistakes.

1. (1 point) Give the day and time when your assigned discussion section meets. State explicitly if you have switched sections recently.

2. (4 points) Simplify or find the values for the following expression: (pick one for each section)

   $\log_k(k^2) =$ $\qquad$ $(\log_k k)^2 =$

   $\gcd(42, 15) =$ $\qquad$ $\mathrm{lcm}(6, 21) =$

3. (4 points) Give a truth table for the following expression and (using your truth table or other means) find a simpler expression equivalent to it. (pick one for each section)

   $p \wedge (p \vee q) =$ $\qquad$ $(p \wedge q) \vee q =$

p	q			
T	T			
T	F			
F	T			
F	F			

4. (4 points) If $\sum_{k=0}^{n} 2^k = 2^{n+1} - 1$, give a closed-form expression for the following summation. Show your work.

$$\sum_{k=0}^{n+1} 2^{k-1} = \qquad\qquad \sum_{k=0}^{n+1} (2^k - 1) =$$

5. (4 points) Label each of the following equivalences, formulas, and claims as "true" or "false." (Permute for the two sections)

   (a) $3 \mid -6$

   (b) $\sqrt{2} \in \mathbb{Q}$ $\qquad$ -3 is prime

   (c) For any real number x, $2\lfloor x \rfloor = \lfloor 2x \rfloor$ $\qquad$ $(\lfloor x \rfloor)^2 = \lfloor x^2 \rfloor$

   (d) There are integers m, n such that $n \mid m$ and $m \mid n$

6. (3 points) State the negation/contrapositive of the following statement, using logical equivalences to put it into a form where each "not" is on an individual (non-complex) proposition. Show your work and give your final answer in words (not logical shorthand).

   For any theory T, if T is also pitted, then T is both jeffy and harpled.
   (negation)
   For any theory T, if T is both jeffy and harpled, then T is also pitted.
   (contrapositive)