CS 171
Homework Assignment 8t

Given: March 06, 2012 **Due:** March 08, 2012

This assignment is due by the end of the class on the due date. Unless all problems carry equal weight, the point value of each problem is shown in [ ]. To receive full credit all your answers should be carefully justified. Each solution must be the student's own work. Assistance should be sought or accepted only from the course staff. Any violation of this rule will be dealt with harshly.

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[5] 1. Let p, q, and r be the following propositions.

p: You get an A on the final exam.

q: You do every exercise in the text book

r: You get an A in the course.

Express the following propositions using p, q, r and logical operators.

(a) You get an A in the course but you do not do every exercise in the text book.

(b) You get an A on the final exam, you do every exercise in the text book, and you get an A in the course.

(c) To get an A in the course it is necessary for you to get an A on the final exam.

(d) You get an A on the final, but you don't do every exercise in the text book; nevertheless, you get an A in the course.

(e) Getting an A on the final exam and doing every exercise in the text book is sufficient for getting an A in the course.

(f) You will get an A in the course if and only if you either do every exercise in the text book or you get an A on the final exam.

[5] 2. Rewrite the following formally using quantifiers and variables, and write a negation for the statement.

(a) Everybody loves somebody.

(b) Somebody loves everybody.

(c) Any even integer equals twice some other integer.

(d) There is a program that gives the correct answer to every question that is posed to it.

(e) There is a prime number between every integer and its double.

[5] 3. Decide if the following proposition forms are a tautology using a truth table.

(a) $(p \vee q) \vee (\neg p \vee \neg q)$

(b) $(p \wedge q) \rightarrow (p \rightarrow q)$

[25] 4. Prove or disprove the following.

(a) For every prime p, $p + 2$ is a prime.
(b) For all integers m and n, $m+n$ and $m-n$ are either both odd or both even.
(c) For any positive real numbers x and $y \leq x$, $\lfloor x - y \rfloor = \lfloor x \rfloor - \lfloor y \rfloor$.
(d) For all natural numbers x, $x^2 - x + 3$ is odd.
(e) For all natural numbers m, if m is even then m^7 is even