York University   CSE/MATH 1019A   September 10, 2007

Homework Assignment #2
Due: September 17, 9:30 a.m.

1. Are the formulas
$$(p \rightarrow q) \vee (r \rightarrow p)$$
and
$$\neg(\neg q \wedge r)$$
logically equivalent? Show your answer is correct.

2. Suppose we have 100 pigeons and 100 pigeonholes. Let $P(x, y)$ represent the statement "Pigeon number x is in pigeonhole number y." Assume the domain for variables is $\{1, 2, 3, \ldots, 100\}$. Using quantifiers and the predicate $P(x, y)$, write down formulas for each of the following statements:

   (a) Each pigeonhole contains a pigeon.

   (b) Each pigeon is in a pigeonhole.

   (c) No pigeon is in two different pigeonholes.

   (d) If some pigeonhole is empty, then some pigeonhole contains (at least) two pigeons.