PHILADELPHIA UNIVERSITY
DEPARTMENT OF BASIC SCIENCES

First Exam **DISCRETE STRUCTURES** **17–11–2005**

Each problem is worth 4 points.

1. Draw the truth table for the proposition $(p \vee \neg q) \leftrightarrow (\neg p \wedge q)$. Is this a tautology or contradiction or contingency?

2. Convert the proposition $p \oplus (q \rightarrow r)$ to a DNF and a CNF.

3. Given the predicate P(x,y): $y - x^2 < 0$, answer True or False.
   a) $\exists x \exists y$ P(x,y)
   b) $\exists x \forall y$ P(x,y)
   c) $\exists y \forall x$ P(x,y)
   d) $\forall x \exists y$ P(x,y)

4. Prove that if $X^2 + 2X - 5$ is odd then X is even.

5. Convert the number 2345 to binary, octal, and hexadecimal.