## Exam 1, Fall 2003, Math 174

PRINT Your Name:_____

There are 10 problems on 4 pages. Each problem is worth 5 points.

$\boxed{CIRCLE}$ your answers.

1. **(a)** Write 273 in base 2.
**(b)** Write 273 in base 16.

2. Are $p \wedge (q \vee r)$ and $(p \wedge q) \vee (p \wedge r)$ logically equivalent? Justify your answer.

3. What is negation of $x < 2$ or $4 \leq x$?

4. Write $(p \vee \sim q) \rightarrow r$ using $\wedge$, $\vee$, and $\sim$, but not $\rightarrow$.

5. Is the argument

$$p \rightarrow q$$
$$\sim p$$
$$\therefore \sim q$$

valid? Jutify your answer.

6. True or False. If true, **prove** it. If false, then give a **counterexample**. For all integers $n$ and $m$, if $n - m$ is even, then $n^3 - m^3$ is even.

7. True or False. If true, **prove** it. If false, then give a **counterexample**. The sum of any two irrational numbers is irrational.

8. Is the argument:
All healthy people eat an apple a day.
Helen eats an apple a day
therefore Helen is a healthy person
valid? Jutify your answer.

9. Write the following sentence in if – then form: "Earning a grade of C minus in this course is a sufficient condition for it to count toward graduation."

10. What is the negation of: $\forall$ colors $C$, $\exists$ an animal $A$ such that $A$ is colored $C$.