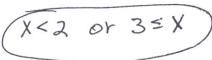# Math 174 Fall 1998     Exam 1

PRINT Your Name:_____

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

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

**NO**

| p | q | r | $p \wedge (q \vee r)$ | $(p \wedge q) \vee r$ |
|---|---|---|---|---|
| T | T | T | T | T |
| T | T | F | T | T |
| T | F | T | T | T |
| T | F | F | F | F |
| F | T | T | F | T |
| F | T | F | F | F |
| F | F | T | F | T |
| F | F | F | F | F |

rows 5 + 7 disagree

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

$X < 2$ or $3 \leq X$

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

$\sim (p \wedge \sim q) \vee r$