# Math 431, Assignment #2

*(due 2/8/01)*

Remember, as on the previous assignment, to indicate how many hours you spent on the assignment. That will keep me from assigning problem sets that take too much time for the majority of the students to complete in a reasonable amount of time.

Also please indicate whom you worked with. This will not affect your grade, and you are encouraged to work with other students in the class, as long as you tackle each problem on your own before seeking to collaborate, and as long as you write up the solution independently.

1. Problem 2.8.

2. Theoretical Exercise 11 (page 63).

3. (a) If $P(A) = .5$ and $P(B) = .4$, but we have no further information about the events $A$ and $B$, how big might $P(A \cup B)$ be? How small might it be? How big might $P(A \cap B)$ be? How small might it be?
   (b) Repeat the full analysis under the assumption $P(A) = .5$ and $P(B) = .6$.

4. Problem 2.10.

5. Problem 2.14.

6. Problem 2.34.

7. Problem 2.37.

8. Gail is a better tennis player than Hilda; when I play Gail I win 1/3 of the time, whereas when I play Hilda I win 2/3 of the time. Suppose that I have time to play three matches, and that I must either play Gail-then-Hilda-then-Gail or Hilda-then-Gail-then-Hilda. Suppose further that my goal is to win *at least two matches in a row*. Which of the two possibilities maximizes my chances of achieving this — the first option

(in which I play the better player twice) or the second option (in which I play the better player only once)?

9. If I catch 4 raccoons in a preserve containing $K$ males and $K$ females, what is the chance that I get 2 of each? Express your answer as a function of $K$. What happens to your answer as $K$ goes to infinity? (Why does this behavior make sense?)

**ALSO**: Each of the preceding nine problems is worth 11 points. At the end of the problem set, include an estimate of your total score. You can get up to five extra bonus points if your estimate is close enough. (Note: Scores over 100 will be rounded down to 100.)