Name: Section (circle one): 9 am 10 am

Math 461, Sections B/C, Spring 2009
HW Assignment 5, due Friday, 3/6/2009

Instructions

- **Write your name on the cover sheet and staple the sheet to the assignment.** Do the problems in order, and make sure that each problem is clearly labelled. The assignment is due **in class** on the above due date. **Late homework, or homework dropped off in mailboxes, will not be accepted.** (You can, however, turn in the homework early, in my office, 241 Illini Hall, at any day before the due date.) If you cannot turn in an assignment on time, but have a legitimate excuse (e.g., illness), with appropriate documentation, the assignment will be marked as "excused"; see the Course Information Sheet handed out at the beginning of class for details.

- **Computations of p.m.f.'s.** The first group of the problems below ask to compute the p.m.f. of a given, explicitly described, r.v. X. This requires computing the probabilities $P(X = x_i)$, for *each* of the values x_i. In most cases, these probabilities need to be computed individually, with a separate computation for each value x_i (e.g., first $P(X = 1)$, then $P(X = 2)$, etc.). These individual computations are of the type that have come up in Chapters 1 and 2 and should be done using the methods developed in these chapters.

- **Exercises in using the definitions and properties of p.m.f.'s, c.d.f.'s, expectation, and variance.** Problems 19, 38, and the last problem are of this type. The last problem is an easy exercise in using appropriate definitions and properties; I included this problem since the book did not have any good problems on this.

- **Problems 15 and 16.** These problems deal with the NBA draft lottery. The cases $X = 1$ (in #15) and Y_1 (in #16) are completely straightforward. The cases $X = 2$ and Y_2 are more difficult, and the result can be left in the form of a summation. (Hint: Condition on the *team* that gets the first draft pick.)
  Extracredit opportunity: Extra credit may be awarded for the remaining (and most difficult) cases, $X = 3$ in #15 and $Y = 3$ in #16. (To earn EC requires a careful write-up of the solution, with full explanations; an answer alone doesn't count. No hints will be given for the EC part.)

HW 5 Problems (pp. 187–197)

1. #1
2. #4
3. #8(a)(c)
4. #13
5. #15 (values 1 and 2 only—see notes above)
6. #16 (cases Y_1 and Y_2 only—see notes above)
7. #19
8. #20(a)(c)
9. #21(b)
10. #38

11. **Additional problem (not in book)** Suppose X is a random variable with values $1, 2, 3, 4$, taken on with probabilities *proportional* to these values (i.e., $P(X = i)$ is proportional to i for $i = 1, 2, 3, 4$).

    (a) Determine the p.m.f. $p(x)$ and the c.d.f. $F(x)$ of X and sketch the graphs of both functions. Your sketch must clearly show the values of these functions at the points $1, 2, 3, 4$, between these points, and to the left and the right of the interval $[1, 4]$.
    (b) Find $E(X)$ and $\text{Var}(X)$.
    (c) Find $E(1/X)$.