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

# Math 461, Sections B/C, Spring 2009
# HW Assignment 3, due Friday, 2/13/2009

## Instructions

- **Read (and follow) the 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.

## HW 3 Problems (pp. 55–61)

The first few problems (through Problem 6) ask to describe outcomes in sample spaces or events. To do this, simply explicitly list all outcomes making up the event or the sample space (e.g., $EF^c = \{(1,3),(2,4),(3,5),(4,6)\}$; see also the examples in the book on p. 24–25.

The second batch of problems (through Problem 14) requires the use of probability rules, in particular, the inclusion/exclusion principle. These problems are typically word problems, so you need to first translate the problems into mathematical language. To do these problems, proceed as follows:

- Identify the events in question and introduce appropriate notation for them (e.g., S = "takes Spanish", F = "takes French").
- Translate the *given* data (probabilities) into this notation (e.g., $P(SF) = 0.12$, etc., (A)). Similarly, translate the probability we want to find into this notation (e.g., "we want $P((S \cup F \cup G)^c)$" (B)).
- Finally, using Kolmogorov axioms and the probability rules derived in class from these axioms (but nothing else), try to get from (A) to (B).

**Make sure to use correct mathematical notation; e.g.,** $P(A) = 0.3$ **(not** $A = 0.3$**),** $\#A = 300$ **(not** $A = 300$**),** $A \cup B$ **(not** $A + B$**), etc.**

The last problem is taken from the "Theoretical Exercises" section, though it really ought to be in the regular exercise section; it is an easy, concrete, practical, and instructive exercise in Venn diagrams and set-theoretic terminology and notation.

1. #1
2. #3(a)(b)(c)(d)(e) (with the 5 parts corresponding to $EF$, $E \cup F$, $FG$, $EF^c$, $EFG$)
3. #5(a)(b)(c)(d) (To simplify the writing in (b), you can use "wildcard" notation such as $(1, 0, 1, *, *)$ to denote all tuples with a 0 or a 1 in place of the asterisks.)
4. #6(a)(b)(c)(d)
5. #10(a)(b)
6. #12(a)(b) (omit (c))
7. #13(a)(b) (omit other parts)
8. #14
9. Theoretical Exercises (p. 61), #6(a)(b)(c)(d) (omit remaining parts). For each of these parts, (i) *draw a Venn diagram with the event described in the part shaded*, and (ii) express the event in terms of $E, F, G$ (e.g., $EFG^c$, or $EFG^c \cup EF^cG$).