## HW 3

## STAT 346, Spring 2010

I'll make each homework assignment worth 10 points, so that when I count your best 10 of 13 assignment scores, your overall homework score will be out of 100 points possible. For this assignment, three of the six problems to be turned in (Problems 1, 2, and 11 through 14) will be selected for grading, with one of them being made to be worth 4 points and the other two worth 3 points apiece.

1) Do Exercise 34 on p. 54 of the text, providing justification for your answer. (*Note:* This one is fairly tough. One way to do it is to let  $F_i$  be the event that no passengers get off on the *i*th floor (i = 2, 3, 4) and note that the desired probability is  $P(F_2^C \cap F_3^C \cap F_4^C)$ . Then use one of DeMorgan's laws and the inclusion-exclusion principle.)

- 2) Do Exercise 28 on p. 61 of the text, providing justification for your answer.
- 3) Do Exercise 8 on p. 59 of the text.
- 4) Do Exercise 21 on p. 60 of the text for the case of m = n = 4.
- 5) Do Exercise 9 on p. 73 of the text.
- 6) Do Exercise 43 on p. 76 of the text.
- 7) Do Exercise 4 on p. 93 of the text.
- 8) Do Exercise 5 on p. 94 of the text.
- 9) Do Exercise 3 on p. 99 of the text. (Assume that the game is played with a standard 52 card deck.)
- 10) Do Exercise 1 on p. 116 of the text.
- 11) Do Exercise 8 on p. 94 of the text.
- 12) Do Exercise 8 on p. 99 of the text.
- 13) Do Exercise 10 on p. 117 of the text.

14) Suppose a bag contains 11 new tennis balls and 1 used one. Further suppose that one of the 12 balls will be selected at random, used, and then returned to the bag (which at that point would then contain either 1 or 2 used balls (depending on whether the ball randomly selected was used or new)). Now suppose that a second random selection is made from the bag. Given that the ball is used, what is the (conditional) probability that it is the ball originally selected? (*Hints*: Let  $U_1$  be the event that the 1st selection is the original used ball, let  $U_2$  be the event that the 2nd selection is a used ball, and let B be the event that the 2nd selection results in the same ball as the first selection. To obtain the desired probability of an intersection) and denominator. For the numerator, apply the multiplication law as you would if using Bayes' formula. But for the denominator, don't use the event B like you would if you continued with Bayes' formula in the usual way. Instead use the law of total probability to express  $P(U_2)$  in terms of probabilities involving both  $U_1$  and  $U_2$ . There might be other approaches that work fine, but doing it this way makes it relatively easy to plug in numbers for all of the various probabilities.)

Turn in solutions for Problems 1 and 2, and 11 through 14, but not 3 through 10.