

*Due Tuesday, February 12, beginning of class*

## Assigned Problems

- (1.7.41)** A bet is said to carry 3 to 1 odds if you win \$3 for each \$1 bet. What must the probability of winning be for this to be a fair bet?
- (1.7.44)** A roulette wheel has slots numbered 1 to 36 and two labeled with 0 and 00. Suppose that all 38 outcomes have equal probabilities. Compute the expected values of the following bets. In each case you bet one dollar and when you win you get your dollar back in addition to your winnings.
  - You win \$1 if one of the numbers 1 through 18 comes up.
  - You win \$2 if the number that comes up is divisible by 3 (0 and 00 do not count).
  - You win \$35 if the number 7 comes up.
- Show that if  $X$  and  $Y$  are random variables taking on only two values each, and if  $E(XY) = (EX)(EY)$ , then all the possible events associated with  $X$  and  $Y$  are independent. This tells us that the *random variables*  $X$  and  $Y$  are independent.
- (1.7.51)** Find the mean and variance of the number of games in the World Series. Recall that it is won by the first team to win four games. You may assume that the outcomes are determined by flipping a fair coin.
- (1.7.56)** Suppose  $P(X \in \{1, 2, 3\}) = 1$  and  $EX = 2.5$ . What are the smallest and largest possible values for the variance?
- A random sample of 2400 people are asked if they favor a government proposal to develop new nuclear power plants. If 40% of the people in the country are in favor of the proposal, find the expected value and the standard deviation for the number  $S_{2400}$  of people in the sample who favored the proposal.
- (2.7.13)** A person has 12 friends and will invite 7 to a party.
  - How many choices are possible if Al and Bob are feuding and will not both go to the party?
  - How many choices are possible if Al and Betty insist that they both go or neither one goes?
- (2.7.25)** How many ways can 5 history books, 3 math books, and 4 novels be arranged on a shelf if the books of each type must be together?
- (2.7.16)** Six students – three boys and three girls – line up in a random order for a photograph. What is the probability that the boys and girls alternate?
- (2.7.17)** Seven people sit a round table. How many ways can this be done if Mr Jones and Miss Smith
  - Must sit next to each other, and
  - Must not sit next to each other?

## News Assignment 1

Find a news article, popular science piece, or scientific article that discusses or applies some aspect of probability theory. This assignment is designed to provide structure for exploring the many ways in which probability is used in the world around us, and to help you prepare for finding a project topic of interest to you and your group members.

Prepare a typed, or neatly hand-written, summary of your chosen article. It should be between 1/2 and 1 page in length, and it should contain:

1. A citation for the article, in either MLA or APA format.
2. A 1-2 paragraph summary of the article contents, including the thesis and main argument. The idea here is for someone else in the class to be able to understand what the article was about without having to read it or have familiarity with subject matter that is not probability-related.
3. A 1 paragraph summary of how the article relates to a specific topic in our probability course. We don't need to have covered it yet, but it should either be a topic on the schedule, or an extension of a topic listed. If we haven't covered the probability topic yet, include a description of it in qualitative terms or in terminology that has been discussed in class.

Turn this summary in *separately* from the main homework assignment, since we will be discussing them in class.