

MATHEMATICS 191, FALL 2003
MATHEMATICAL PROBABILITY
Assignment #2

Problems to be discussed in section:

All problems are from Grimmett and Stirzaker, 1000 Exercises in Probability.
The solutions are all in the book!

Add together the number of letters in your first and last name. If the sum is odd, prepare problems 1, 3, and 5. If it is even, prepare 2, 4, and 6.

1. Section 1.4, problem 3, excluding part (v).
2. Section 1.4, problem 4.
3. Section 1.5 , problem 2.
4. Section 1.8, problem 24.
5. Section 1.8, problem 27.
6. Section 1.8, problem 16.

Problems to be handed in on Thursday, Oct. 2 :

1. Section 1.5, problem 5. Invent a different solution from the one given by the authors!
2. The last problem from the "Bayesian Bible" that was attached to outline 3.
3. General Dostum, to his amazement, has captured a female storyteller named Bernoulli (like most Afghans, she uses only one name). She offers to tell him a story every day, on condition that he will not turn her over to the CIA that day if her story makes him laugh. Since Dostum has a fine sense of humor, the probability that a story will NOT make him laugh is $p = 1/5$.
 - (a) What is the probability that she is turned over to the CIA after telling precisely 3 stories?
 - (b) What is the probability that she is turned over to the CIA on or before the third day?
 - (c) Donald Rumsfeld is asked by a reporter, on the day of her capture, "What day is the CIA most likely to gain custody of Bernoulli?" What is his correct answer? Explain.
4. Boxcar Bob owns three dice. Two of them are unloaded, but the third has $p = 1/2$ for a 6, and $p = 1/10$ for the numbers 1 through 5. Event B is that he rolls a randomly chosen die three times, and a 6 appears precisely once. Event A is that Bob is using the loaded die.
 - (a) Calculate $\mathbb{P}(A \cap B)$, $\mathbb{P}(A^c \cap B)$, and $\mathbb{P}(B)$.
 - (b) Given event B , what is the conditional probability that Bob is using the loaded die?
5. Prove that any set of disjoint intervals of positive length is countable, but that the set of all intervals of positive length is countable.