

**Homework Set 2****EECS 401****Due: Friday, Jan. 21, 2000,**  
in class before lecture begins.

Reading Assignment: Read Sections 2.3, 2.4, 2.5.

Things to practice on your own:

Working with the axioms of probability.

Problems from Leon-Garcia's book:

1. Find a probability model for the experiment of problem 2-4, p. 73. (This was one of the cancelled parts of the previous assignment.)
2. 2-20, p. 75.
3. Find a probability model for the experiment for problem 2-23, p. 75. Then do the problem.
4. 2-24, p. 75, except assume that  $A = \{k > 2\}$  and  $B = \{k > 4\}$  (Hint: The experiment described here is closely related to that in the previous problem.)
5. 2-29, p. 76.

Other Problems

6. Which of the following are true statements?
  - (a) If  $E \subset F$ , then  $F^c \subset E^c$ .
  - (b)  $F = FE \cup FE^c$ .
  - (c)  $E \cup F = E \cup FE^c$ .
  - (d) If  $E \cap F = \phi$  and  $F \cap G = \phi$ , then  $E \cap G = \phi$ .
  - (e) If  $E \subset F$ , then  $E \cap G \subset F \cap G$ .
  - (f) If  $P(A \cup B) = P(A) + P(B)$ , then  $A$  and  $B$  are disjoint.
7. A 5-sided die is tossed and the outcome is the number facing down. We are given the probabilities of the following events.
$$P(\text{odd}) = .7, P(\{1,5\}) = .4,$$
Find the probabilities of as many of the following events as possible.
$$\{1\}, \{2\}, \{3\}, \{4\}, \{5\}, \{1,3\}, \{2,4\}, \{2,5\}$$
8. Suppose  $A$  and  $B$  are subsets of a sample space  $S$  and  $P(A) = 1$ . Use the axioms of probability to prove the following:
  - (a)  $P(A \cup B) = 1$ .
  - (b)  $P(A \cap B) = P(B)$ .

continued on the other side

9. Suppose A and B are subsets of a sample space S and  $P(A) = 0$ . Use the axioms of probability to prove the following:
- (a)  $P(A \cup B) = P(B)$ .
  - (b)  $P(A \cap B) = 0$ .
10. A certain store accepts either the American Express or the VISA credit card. It finds that when a customer enters the store, the probability is .24 that he/she carries an American Express card, .61 that he/she carries a VISA card, .11 that he/she carries both, and .45 that he/she carries a Master card. What is the probability that a customer carries a credit card that the store will accept?
11. You are on a trip from Detroit to Denver with a change of planes in Chicago. The plane from Detroit to Chicago arrives randomly between 12:00 noon and 1:00 PM. The connecting plane from Chicago leaves randomly between 1:00 PM and 2:00 PM. To make the connection, at least 30 minutes are required between planes. What is the probability that you will miss your connection? (Hint: It might be wise to make a probability model before attempting to find the answer.) Roberts, 2.25, p. 64. (this requires an independence assumption)