

### Homework 3, ISyE 2027 Spring 2006

Due on Monday, February 6

**Problem 1:** Let  $A, B$  be two mutually exclusive events. Furthermore, suppose  $P(A) > 0$  and  $P(B) > 0$ . Are  $A$  and  $B$  independent?

**Problem 2:** Hayter, Problem 1.4.10 (see Problem 1.2.11 for description of the sample space. YOU DO NOT HAVE TO SOLVE PROBLEM 1.2.11).

**Problem 3:** Hayter, Problem 1.5.6.

**Problem 4:** A family has three children, each of whom is a boy or a girl with probability  $1/2$ . Let  $A =$  "there is at most one girl",  $B =$  "the family has children of both sexes". (a) Are  $A$  and  $B$  independent? (b) Are  $A$  and  $B$  independent if the family has four children?

**Problem 5:** Let  $A$  and  $B$  be two independent events with  $P(A) = 0.4$  and  $P(A \cup B) = 0.64$ . What is  $P(B)$ ?

**Problem 6:** Two events have  $P(A) = 1/4$ ,  $P(B|A) = 1/2$ , and  $P(A|B) = 1/3$ . Compute  $P(A \cap B)$ ,  $P(B)$  and  $P(A \cup B)$ .

**Problem 7:** You are going to meet a friend at the airport. Your experience tells you that the plane is late 80% of the time when it rains, but it is late only 15% of the time when it does not rain. The weather forecast that morning calls for a 70% chance of rain. What is the probability the plane will be late?

**Problem 8:** In a certain city  $3/10$  of the people are Conservatives,  $1/2$  are Liberals, and  $1/5$  are Independents. In a given election,  $2/3$  of the Conservatives voted,  $4/5$  of the Liberals voted, and  $1/2$  of the Independents voted. If we pick a voter at random what is the probability the voter is a Liberal?