STAT310
Practice Problems
Week 1

January 24, 2012

1 Defining sample spaces.

1. **Single coin toss.** A coin is tossed three times. Define the appropriate sample space Ω for the following cases:

   (a) The outcome of each individual toss is of interest.
   (b) Only the number of trials is of interest.

2. **Tossing two coins simultaneously.** Two coins are now tossed simultaneously. Define the appropriate sample space Ω of possible outcomes.

3. **Tossing two coins in sequence.** Two coins are now tossed in sequence, i.e. one after another. Define the appropriate sample space Ω of possible outcomes.

4. **Infinite coin toss.** A coin is repeatedly tossed until the first tail shows up. Define the appropriate sample space Ω of possible outcomes.

2 Unions and intersections I.

Suppose we toss two coins and suppose that each of the four points in the sample space $\Omega = \{HH, HT, TH, TT\}$ is equally likely. Let the events be $A = \{HH, HT\}$ and $B = \{HH, TH\}$. Calculate:

1. $P(A \cup B)$

2. $P(A \cap B)$

3. $P(\overline{\overline{A} \cup \overline{B}})$

3 Unions and intersections II.

In a survey, 1000 adults were asked if they would approve an increase in tax if the revenues went to build a football stadium. It was also noted whether the person lived in a city (C), suburb (S), or rural area (R), of the county. The results are summarized in Table 1. Define the following events:
   A: person chosen is from the city
   B: person disapproes tax increase
Find the following probabilities:

1. $P(B)$

2. $P(A^C \cap B)$

3. $P(A \cup B^C)$

Table 1: Survey results on tax increase and place of residence.

	Yes (for tax increase)	No (against tax increase)
C	150	250
S	250	150
R	50	150

4 Counting.

In a box there are ten slips of paper, with one of the letters B, E, K, O, P, R written on each slip. If the slips are drawn out of the box one at a time, what is the probability of obtaining the word *BOOKKEEPER*?

5 The Boy or Girl problem.

You meet a man on the street and he says, "I have two children and one is a boy." What is the probability that the other child is a girl?

6 The Tuesday Birthday problem.

You meet another man on the street who says, "I have two children and one is a son born on a Tuesday." What is the probability that the other child is also a son?