Math/stat 302 102[1] September 11, 2000 Worksheet 1

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1. A die is rolled and then a coin is tossed. Describe the sample sp ace for this experiment.

2. From a deck of 52 cards, two cards are chosen at random without replacement. What are the number of elements in the sample space ? What is the probability of the event E that ace chosen followed by a king ? *Ans: 16/ 52 C2*

3. Suppose an urn contains 7 black and 5 white balls. We draw two balls from the urn without replacement. Assuming that each ball in the urn is equally likely to be drawn, what is the probability that both drawn balls are black ? *Ans : 42/132*

4. Suppose that each of three women at a party throws here hat into the center of the room. The hats are first mixed up and then each one randomly selects a hat. What is the probability that none of the three women selects her own hat ? **Use:** It is known that if A, B and C are events then $P(A \cup B \cup C) = P(A) + P(B) + P(C) - P(A \cap B) - P(A \cap C) - P(B \cap C) + P(A \cap B \cap C)$ *Ans: 1/3*

5. Suppose we toss two fair dice: Let E_1 denote the event that the sum of the dice is six. E_2 denote the event that sum of the dice equals seven. Let F denote the event that the first die equals four.
   (a) Is E_1 independent of F ? why ?
   (b) Is E_2 independent of F ? why ?

6. Assuming the three axioms of probability show the following:
   (a) If A is an event and $\bar{A}$ its complement, then $P(\bar{A}) = 1 - P(A)$
   (b) $P() = 0$
   (c) If $A \subset B$ are two events then the $P(A) \leq P(B)$.
   (d) For any two events A and B, $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
   (e) If $A_1, A_2, \ldots, A_n, \ldots$ are mutually exclusive events then $P(\cup_{i=1}^{\infty} A_i \mid B) = \sum_{i=1}^{\infty} P(A_i \mid B)$

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[1] **Office hours:** Monday:2:00-3:00pm, Tuesday:10:30-11:30, 3:30-4:30 pm