Homework based on Chapter 2
Computational Probability and Statistics
CIS 2033, Section 002

Due: 9:00 AM, Friday, Jan. 23, 2014

Question 1 Let E and F be two events in a sample space for which $P(E) = 1/3, P(F) = 1/2$ and $P(E \cup F) = 2/3$, what is $P(E \cap F)$?

Question 2 Let A and B be two events for which one knows that the probability that at least one of them occurs is 2033/3302. What is the probability that neither A nor B occurs? Hint: use one of DeMorgan's laws:$A^c \cap B^c = (A \cup B)^c$

Question 3 We consider events A, B, and C, which can occur in some experiment. Is it true that the probability that only A occurs (and not B or C) is equal to $P(A \cup B \cup C) - P(B) - P(C) + P(B \cap C)$?

Question 4 We toss a coin three times. For this experiment we choose the sample space

$$\Omega = \{HHH, THH, HTH, HHT, TTH, THT, HTT, TTT\}$$

where T stands for tails and H for heads.

(a) Write down the set of outcomes corresponding to each of the following events:

- A : "we throw tails exactly two times."
- B : "we throw tails at least two times."
- C : "tails did not appear before a head appeared."
- D : "the first throw results in tails."

(b) Write down the set of outcomes corresponding to each of the following events: $A^c, A \cup (C \cap D), A \cap D^c$

Question 5 In some experiment first an arbitrary choice is made out of four pospossibilities, and then an arbitrary choice is made out of the remaining three possibilities. One way to describe this is with a product of two sample spaces $\{a, b, c, d\}$:

$$\Omega = \{a, b, c, d\} \times \{a, b, c, d\}$$

Here the first entry gives the choice of the candidate, and the second entry the choice of the quizmaster.

(a) Make a 4×4 table in which you write the probabilities of the outcomes.

(b) Describe the event "c is one of the chosen possibilities" and determine its probability.