Homework No. 2   (Due on 02/06/14)

Problem 1.   Calculate the probability that a hand of 13 cards dealt from a normal shuffled pack of 52 contains exactly two kings and one ace. What is the probability that it contains exactly one ace given that it contains exactly two kings.

Problem 2.   A fair die having two faces colored blue, two red, and two green, is thrown repeatedly. Find the probability that not all colors occur in the first k throws.

Problem 3.   An ECE department consists of 25 full professors, 15 associate professors, and 35 assistant professors. A committee of 6 is selected at random from the faculty of the department.

 (a) Find the probability that all members of the committee are assistant professors.

 (b) Find the probability that the committee of six is composed of 2 full professors, 3 associate professors, and 1 assistant professor.

Problem 4.   A lot of transistors contains 0.6 percent defectives. Each transistor is subjected to a test that correctly identifies a defective but also misidentifies as defective about two in every 100 good transistors. Given that a randomly chosen transistor is declared defective by the tester, compute the probability that it is actually defective.

Problem 5.   On a TV show, a contestant is required to throw a die. She then tosses as many coins as there were spots shown on the die. If she throws exactly four heads, she wins $\$10,000$. What is the probability she wins?

Problem 6.   Show that if A, B and C are three events such that $\mathbb{P}(C \mid A \cap B) = \mathbb{P}(C \mid B)$, then $\mathbb{P}(A \mid B \cap C) = \mathbb{P}(A \mid B)$.

Problem 7.   A fair die is thrown n times. Show that the probability that there are an even number of sixes is

$$\tfrac{1}{2}\left[1 + \left(\tfrac{2}{3}\right)^n\right] .$$

Problem 8.   A fair coin is thrown repeatedly. What is the probability that on the nth throw:

 (a) a head appears for the first time?

 (b) the numbers of heads and tails are equal?

 (c) exactly two heads have appeared altogether to date?

 (d) at least two heads have appeared altogether to date?