MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering & Computer Science
6.041/6.431: Probabilistic Systems Analysis
(Fall 2010)

Tutorial 2
September 23/24, 2010

1. A player is randomly dealt 13 cards from a standard 52-card deck.

   (a) What is the probability the 13th card dealt is a king?

   (b) What is the probability the 13th card dealt is the first king dealt?

2. Consider a random variable X such that

$$p_X(x) = \frac{x^2}{a} \text{ for } x \in \{-3, -2, -1, 1, 2, 3\}, \quad \mathbf{P}(X = x) = 0 \text{ for } x \notin \{-3, -2, -1, 1, 2, 3\},$$

   where $a > 0$ is a real parameter.

   (a) Find a.

   (b) What is the PMF of the random variable $Z = X^2$?

3. 90 students, including Joe and Jane, are to be split into three classes of equal size, and this is to be done at random. What is the probability that Joe and Jane end up in the same class?

4. Draw the top 7 cards from a well-shuffled standard 52-card deck. Find the probability that the 7 cards include exactly 3 aces.