Math 105 91A[1] March 28th, 19100 Worksheet 13

http://www.math.ubc.ca/~ athreya/105 Sections: 10.1, 10.2, 18.1

1. You have a nickel, 2 dimes, and a quarter in your back pocket. You need to pay 35 cents as your bus fair. You begin by randomly choosing coins till they total upto the required amount. If X is the number of coins that you pick, find its its probability density function f.

   Ans: Will solve in class.

2. Suppose X a continuous random variable has the proability density function

$$f(s) = \begin{cases} \frac{1}{b-a} & a \le s \le b \\ 0 & \text{otherwise} \end{cases}$$

   Then find:

   (a) $F(x) = P(X \le x)$. for all values of x. F is called the distribution function of X.

   (b) What is the meaning of $F(b) - F(a)$?

   (c) $E(X)$ and σ^2.

   X is called the uniform random variable.

   Ans: Done in text book

3. Suppose X a continuous random variable has the proability density function

$$f(s) = \begin{cases} ke^{-ks} & s \ge 0 \\ 0 & \text{otherwise,} \end{cases}$$

   where k is a constant. Then find:

   (a) $F(x) = P(X \le x)$. for all values of x. F is called the distribution function of X.

   (b) What is the meaning of $F(b) - F(a)$?

   (c) $E(X)$ and σ^2.

   X is called the exponential random variable.

   Ans: Done in Text book.

[1] **Office hours:** Monday:1:30-2:30pm, 3-4pm, Tuesday:11:30-12:30 am, 3:30-4:30 pm, Wednesday: 10:30-11:30 am

4. Two urns contain numbered marbles. Urn I contains balls numbered 1,2, and 4. Urn II contains ball numbered 3,5, and 6. A ball is drawn at random from urn I. If the ball is numbered 2 or 4, a second ball is drawn from the same urn without replacement. If the ball has the number 1, the second ball is drawn from urn II. If X is the random variable which gives the total on the two balls, calculate $E(X)$, $P(X = 10)$ and P(X ¡ E(X)).

   Ans: $E(X) = 5.22, P(X = 10) = 0, P(X < E(X)) = \frac{4}{9}$.

5. Suppose the lifetime in years of a mechanical component is a continuous random variable with probability density function

$$f(x) = \begin{cases} C(2x - \frac{x^3}{3}) & 0 \leq x \leq 2, \\ 0 & \text{otherwise,} \end{cases}$$

   where C is a constant.

   (a) Find the value of C.

   (b) Find the expected lifetime.

   (c) Find the median lifetime

   em Ans: $C = \frac{3}{8}, 1.2, 1.236$.