



Date: 08/08/2015 Deadline: Monday (10/08/15) Morning Homework 1 for B.E ECE (V Sem)

1. *Rolling a die*: Suppose we have a fair die which we roll once. Write the sample space (Ω) for this experiment. Also what are all the possible events with this experiment, write them. Verify the postulates of probability space via this experiment (i.e., union, intersection, complement of event should belong to sample space). Also write probability density function for this experiment. Finally completely specify the probability triplet for this experiment, i.e., (Ω, E, P)

2. Find the value of constant k so that the following function becomes a valid probability density function (pdf):

$$f(x) = \begin{cases} ce^{-x}, & \text{for } 0 \leq x \leq 1 \\ 0, & \text{otherwise} \end{cases}$$

3. For two discrete random variables X and Y where X takes any value from $\{x_1, x_2, \dots, x_n\}$ with probabilities $\{p(x_1), p(x_2), \dots, p(x_n)\}$, Y takes from $\{y_1, y_2, \dots, y_n\}$ with probabilities $\{p(y_1), p(y_2), \dots, p(y_n)\}$. Can you prove for this case that expectation is linear operator i.e.,

$$E(X + Y) = E(X) + E(Y) \quad (1)$$

where E is expectation of a random variable.

4. We defined Information measure in the class. A very simple question, for a coin tossing experiment where probability of head and tails is $1/2$, if head is mapped to 0 and tail to 1, so we have equivalent random variable $X \in \{0, 1\}$, can you calculate average information for this random variable. (Use the Entropy equation we did in class).

Since this is first assignment, i put it short. Enjoy weekend