



DEPARTMENT OF ELECTRONICS &
COMMUNICATION
Pattern Classification (Code: ECEM-208)

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Date: 27/04/2017 Deadline: Monday (01/05/11) Morning *Homework 1 for M.Tech (CIT) ECE (II Sem)*

1. Learn about the following discrete random variables and find mean, variance of each of them. Show all the steps: 1) Bernoulli random variable 2) Binomial random variable 3) Geometric random variable.
2. Let X be a random variable with mean 2 and variance 4, Y another random variable with mean 3 and variance 6. Assume X and Y are independent. Define two new random variables $W = 2X + 3Y$ and $Z = 3X - Y$. Compute the covariance of W and Z .
3. Let X be uniformly distributed random variable in interval $[-1,1]$ and Y be another uniformly distributed random variable in the same range i.e., $[-1,1]$. Define another random variable $Z = X + Y$, find the density of Z . (Hint: Use the fact that density of sum of two random variables is convolution of the densities)
4. In the class we studied the joint density of bi-variate Gaussian random variables (x_1, x_2) . Use the same assumptions as in class, i.e., about mean, variance, correlation, find the conditional probability density of x_2 given x_1 i.e., $p(x_2|x_1)$.
5. As discussed in the class, if x is Gaussian random variable with the following density

$$p(x) = \frac{1}{\sqrt{2\pi}\sigma} e^{-\left(\frac{(x-\mu)^2}{2\sigma^2}\right)} \quad (1)$$

prove that variance of x is σ^2 .