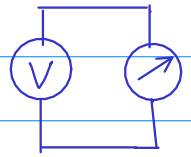
AVD613 - Assignment 1

Out : 3|8|2018, Due : 10|8|2018

① Find out 3 examples of standard discrete random variables (other than Bernoulli, Binomial, Geometric, Poisson)

② Consider the following experiment where I measure the value of voltage of an unknown voltage source (V).



a) I measure the voltage 10 times and get the following readings : 0, 1, 0, 0, 1, 1, 0, 0, 0, 0. Can you model the voltge source as a random variable? Specify the random variable model.

b) Suppose I now measure the voltage 20 times for another voltge source and get the following values : 0, 1, 2, 3, 0, 0, 1, 1, 2, 2, 3, 4, 0, 0, 4, 1, 1, 2, 2, 1. (can you model the voltge source as a random variable? what about as a standard random variable? Specify the random variable model in both cases

③ Show that $\mathbb{E}X = np$ where X is a Binomial R.V with parameters n and p.

④ Find out $\mathbb{E}X$ for X being a Poisson R.V with parameter λ.

⑤ Find out $\mathbb{E}x$ for x being a Geometric R.V with parameter p

⑥ Find out the variances of the following random variables.

a) Binomial - parameters n and p

b) Bernoulli - parameters n and p.

c) Poisson - parameter λ.

⑦ Suppose X is a discrete random variable with $\Omega_X = \{0, 1, 2\}$ and the first moment $\mathbb{E}X = 0.75$. Find out the set of possible $(P_X(x))$ that X can have.

⑧ Suppose X is a discrete random variable with $\Omega_X = \{-2, 0, 1, 2\}$ and $p_X(0) = 0.25$, $p_X(1) = 0.1$, $p_X(2) = 0.5$. Suppose $Y = |X| + 2$. Specify Ω_Y, $P_Y(y)$ and $\mathbb{E}Y$.