

Q1. Give a practical example of the application of Bernoulli random variable, binomial random variable & Poisson random variable.

→ When there is only one bit required for transmission of message signal, the Bernoulli RV is used to ~~under~~ understand noise.

It is used for binary data generators and identifying bit error pattern.

→ In case of sequence of 'n' bit transmission, binomial RV are considered, since binomial distribution is combination of 'n' mutually independent yet identically distributed Bernoulli distribution.

It can be used to model total number of bits received from data sequence of length n.

→ Poisson is special case of binomial to identify rare occurrence when 'n' is very large.

Q2. For a Bernoulli RV, the mean value exists between 0 & 1, but at that point there is no probability assigned. What does the mean value signify?

→ In case of Bernoulli random variable, the mean is the expectation value that determines whether the incoming bit is zero or binary one. Probability assignment isn't required at every point to define mean. Even in case of 0 probability distribution, the mean can be the weighted average of data based upon modelling of probability. It is used to determine the threshold value.

Q3. What is the meaning of Median and mode of Random variable?

For Probability Density Function of a RV,

→ Median is the point on X-axis of PDF at which it divides it into 2 halves.

→ Mode is the point on X-axis of PDF having its highest value.

→ Median is not defined for discrete RV.

Q4. Is there an established relationship b/w Bernoulli RV, Binomial RV & Poisson RV?

→ Binomial RV is a combination of mutually independent yet identically distributed Bernoulli distribution, and can be modelled after that.

→ Poisson is a special case of Binomial where the no. of cases 'n' is very large & the success rate 'p' is very low.

Q5. What is the effect of RV parameter change in the Binomial RV's PDF shape?

→ Changing the 'n' is inversely proportional to the peak value of PDF.

→ Changing the success rate 'p' shifts the peak value of PDF of X-axis.

Q6. What is the typical value, λ , in the case of a Poisson RV? What is the shape of the PDF of this value?

→ $\lambda \leq 0.5$ for Poisson RV, PDF is shaped like exponential decay function.