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Statistics Department

Assignment – No. – 02 **Statistics paper – STA - 201**

1 For the Bernoulli Distribution, derive its mean and variance.
2 Derive the Binomial Distribution.
3 Show that for the Binomial Distribution, mean = np, variance = npq.
4 For the Binomial Distribution, show that the recurrent relation for the central moment is
5
$$\mu_{r+1} = pq\left[n\mu_{r-1} + \frac{d\mu_r}{dp} \right]$$
6 Derive the mean and variance of the Poisson distribution.
7 If a random variable X follows a Poisson Distribution with a parameter λ, such that; P(X=3) = P(X=4). Determine the probabilities of the following: *P(x=1), P(X≤3), P(2<X<5), P(X>3)*
8 For the Beta distribution of first kind, obtain its mean and variance.
9 For the gamma distribution with parameters (a, n), skewness is $1/\sqrt{n}$.
10 The density function of a random variable X is
$$f(x) = \begin{cases} \dfrac{1}{b-a} & , a < x < b \\ 0 & , otherwise \end{cases}$$
Then, show that $E(X) = \dfrac{b+a}{2}$, $V(X) = \dfrac{b^2 - a^2}{12}$.
11 If $X \sim G(a, m)$ and $Y \sim G(a, n)$ be two independently distributed gamma variates, then show that $\dfrac{X}{X+Y}$ follows Beta distribution of first kind.
12 Define the Beta distribution of Second kind and find its harmonic mean.
13 For Normal distribution, show that mean = median = mode = μ.
14 Derive the moment generating function of Binomial Distribution.
15 For the Binomial Distribution, in usual notations, derive the recurrent relation for central moments.
16 Derive the limiting distribution of Poisson distribution.
17 Derive mean and variance of hypergeometric distribution.
18 If a random variable X~ B(n, p) and if E(X) = 4 and V(X) = 3 , then find the parameters of the binomial Distribution.
19 For Poisson distribution, show that
$$k_{r+1} = \lambda \left. \frac{d k_r}{d t^r} \right|_{t=0} \qquad , r = 1,2,3....$$
20 Show that the mean of Beta distribution of 1st kind is *m / (m + n)* where as harmonic mean is *(m – 1) / (m + n - 1)*
21 A random variable X follows an exponential distribution with the pdf

f(x) = $a\,e^{-a\,x}$, $x > 0$, then derive mgf of X.

22 If a r.v. X has an Uniform Distribution U[0,1], then obtain the pdf of -2log X.

23 State and prove the additive property of Gamma Distribution.

24 For normal distribution derive the recurrent relation for the central moments. Hence or other wise show that $\mu_{2r} = 1.3.5............(2r-1)\sigma^{2}$.