INDIAN SCHOOL NIZWA - WORKSHEET

APPLIED MATHEMATICS

4. Probability Distributions

Name: _____ Date:_____ Class: XII Sec: ___

1. A discrete random variable X has the probability distribution given as below

X	0.5	1	1.5	2
P(X)	K	K^2	$2K^2$	K

Find the value of k?

(a) 1 (b) $\frac{2}{3}$ (c) $\frac{1}{4}$ (d) $\frac{1}{3}$

2. Let X be a Discrete random variable assuming values $x_1, x_2, x_3, \ldots\ldots x_n$ with probabilities $p_1, p_2, p_3 \ldots p_n$ respectively. Then variance of X is given by

(a) $E(X^2)$ (b) $E(X^2)+E(X)$ (c) $E(X^2)-E(X)$ (d) $\sqrt{E(x^2)-E(X)}$

3. The probability that a student is not a swimmer is $\frac{1}{5}$.then the probability that out of five students four are swimmers is

(a) ${}^5C_4 (\frac{4}{5})^4(\frac{1}{5})$ (b) $(\frac{4}{5})^4(\frac{1}{5})$

(c) ${}^5C_0 (\frac{4}{5})^4(\frac{1}{5})$ (d) none of these

4. The shape of the Normal Curve is

a) Bell Shaped b) Flat c) Circular d) Spiked

5. For a standard normal variate, the value of mean is?

a) ∞ b) 1 c) 0 d) not defined

6. The probability of guessing correctly at least 8 out of 10 answers on a true-false type examination is

a. $\frac{7}{64}$ b. $\frac{7}{128}$ c. $\frac{45}{1024}$ d. $\frac{7}{41}$

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7.	**Assertion(A):** if 8 coins are tossed simultaneously then probability of getting 1 head is $8(\frac{1}{2})^8$. **Reason (R):** The binomial distribution is the discrete probability distribution that gives only two possible results in an experiment, either Success or Failure. $P(r) = {}_nC_r\, p^r\, q^{n-r}$ Where n = number of trials P = probability of successq = probability of failure
8.	**Assertion(A):** The mean and variance of a binomial variate are 2.4 and 1.44 Respectively,then $q=\frac{2}{5}$ **Reason (R):** If X~ B(n,p) then mean and variance of X are np and npq respectively.
9.	**Assertion(A):**If the mean of a Poisson distribution is 2.56 then standard deviation is 1.6 **Reason (R):** The Poisson distribution has only one parameter, λ (lambda), which is the mean number of events.In Poisson distribution is Mean = Variance = λ. **Solution:**We know Variance=Mean=λ=2.56
10	If X follows binomial distribution with parameters n=5, P(X =2) =9 P(X=3). Find the value of p.
11	For the Poison Distribution , Find P(2), given $\lambda = 0.7$
12	If X is a normal distribution of a random variable with mean 12 and standard deviation 3, Find P (X< 15).
13	A Radar unit is installed to measure the speed of cars in highway. The speeds are normally distributed with mean 80 km/hr and standard deviation 10 km/hr. Find the probability of a car running at lessthan 60 km/hr?
14	If 2 % of books bound in a certain workshop have a defective binding. Find the probability that if 5 books out of 400 books will have defective binding ?
15	Experiance shows that 1.4 % of telephone calls received are wrong numbers. Determine the probability that among 150 calls received 2 are wrong numbers.
16	If 1% of of the electric bulbs manufactured by a company are defective, find the probability that in a sample of 100 bulbs, the number of defective bulbs will be 0,1,2,3,4,5 respectively. Use recurrence relation of poisson distribution. Also find the probability that (i) three or more (ii) less than or equal to 2 bulbs will be defective

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17 Case study

Let X denote the number of hours a person watches television during a randomly selected day. The probability that X can take the values x, has the following form, where 'k' is some unknown constant.

$$P(X=x)=\begin{cases}0.2 & if\ x=0\\ kx & if\ x=1\ or\ 2\\ k(5-x) & if\ x=3\\ 0 & otherwise\end{cases}$$

(i) Find the value of k

(ii) What is the Probability that the Person watches 2 hrs of Television on a selected day

(iii) What is the Probability that the Person watches Television at least 2 hrs on a selected day

OR

What is the Probability that the Person watches Television at most 2 hrs on a selected day

18 A factory produces bulbs, of which 6% are defective bulbs in a large bulk of bulbs.

Based on the above information, answer the following questions

(i) Find the probability that in a sample of 100 bulbs selected at random none of the bulbs are defective (Use $e^{-6}=0.0024$)

(ii) Find the probability that the sample of 100 bulbs has exactly two defective bulbs.

(iii) Find the probability that the sample of 100 bulbs will include not more than one defective bulb.

OR

Find the Mean and Variance of the distribution of number of defective bulbs in a sample of 100 bulbs

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