

## 10+2 Statistics Mock Test

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### 1. Group A Very Short type questions. (1 mark each)

- (a) Write down the result of  $\frac{d}{dx}(1 - e^{-\theta x})$ .
- (b) Write true or false: If two variables are proportional then they do not have any correlation.
- (c) A random variable  $X$  is such that  $P(X = 1) = P(X = 0) = 0.5$ . What is the value of  $P(X > 0)$ ?
- (d) In case of a continuous random variable  $X$ ,  $P(X = 2.22)$  is what?
- (e) If the parameter of a Poisson distribution is 7.83 then what is its mode?
- (f) What is the probability of occurrence of 12345 in a random number series in this order?
- (g) Can any digit repeat in random number series?
- (h) What is the value of 90% cutoff point for normal distribution?

### 2. Group B Short type questions. (2 marks each)

- (a) When are two variables said to be positively correlated?
- (b) When does Spearman's rank correlation coefficient becomes +1? Prove it.
- (c) For a binomial distribution, if  $n = 10$  and  $p = 5/13$ , then what is the value of coefficient of variation?
- (d) Show that a normal distribution is symmetric about its mean.
- (e) State the meaning of "Population" in context of Statistics.
- (f) Is statistic a random variable? Justify.

### 3. Group C Long type questions. (4 marks each)

- (a) Find the first and second order raw moment of the probability distribution with density given by;

$$f(x) = \begin{cases} \lambda e^{-\lambda(x-\theta)} & \text{if } x > \theta \\ 0 & \text{otherwise} \end{cases}$$

- (b) If two variables  $x_1$  and  $x_2$  have a common variance and correlation coefficient  $r \neq 0$ , express  $r$  in terms of  $\theta$  so that,  $x_1 + 2x_2$  and  $x_1 + \theta x_2$  ( $|\theta| < 1$ ) become uncorrelated.
- (c) Derive the two normal equations in case of linear regression on the basis of bivariate data.
- (d) State the disadvantages of determining trend by method of moving average. How can you overcome it?
- (e) An unbiased coin is tossed until the first head occurs. Write down the probability distribution of the number of tosses. Find the median of the distribution.
- (f) If for a Poisson random variable  $X$ ,  $2P(X = 5) = P(X = 6)$ , then what is the value of  $P(X > 0)$ ?
- (g) What is a parameter? What is a statistic? When is unbiased estimator? What is the definition of Minimum Variance unbiased estimator?

### 4. Group D Very Long type questions. (6 marks each)

- (a) Given that for a normal distribution the mean is 65.5 inches and  $P(60.5) = 0.9$ . Find the interval  $(\mu - 3\sigma, \mu + 3\sigma)$
- (b) On the basis of the random sample  $(x_1, x_2, \dots, x_n)$  without replacement from a finite population of size  $N$  with variance  $\sigma^2$ , find the expectation of sample variance. Hence find an unbiased estimate of population variance  $\sigma^2$ .