DU MPhil PhD in Statistics

Topic:- DU_J19_MPHIL_STATS

1) Increments in a Poisson process are

[Question ID = 2580]

1. Both (Independent and orderly) and (Stationary and exponential) [Option ID = 10319]
2. Stationary and exponential [Option ID = 10318]
3. Independent and orderly [Option ID = 10317]
4. None of the these [Option ID = 10320]

Correct Answer :-

- Independent and orderly [Option ID = 10317]

2) Which distribution is a univariate analogue of Wishart distribution

[Question ID = 2568]

1. t distribution [Option ID = 10271]
2. exponential [Option ID = 10269]
3. χ^2 distribution [Option ID = 10270]
4. None of the these [Option ID = 10272]

Correct Answer :-

- exponential [Option ID = 10269]

3) Which of the following statements are true about unrestricted random walks?
1. It is Markovian.
2. Its transition probability is a function of the number of steps in the walk.

[Question ID = 2576]

1. Both 1 and 2 [Option ID = 10303]
2. Only 1 [Option ID = 10301]
3. Only 2 [Option ID = 10302]
4. None [Option ID = 10304]

Correct Answer :-

- Only 1 [Option ID = 10301]

4) Given that a step forward probability p is 0.6, then the probability that a random walk in one dimension ends in state 3 after 5 steps is

[Question ID = 2578]

1. 0.52 [Option ID = 10310]
2. 0.829 [Option ID = 10309]
3. 0.259 [Option ID = 10311]

4. None of these [Option ID = 10312]

Correct Answer :-

- 0.829 [Option ID = 10309]

5) Net reproduction rate cannot be used as a measure of population growth since [Question ID = 2584]

1. it gives an overestimate of the population [Option ID = 10333]
2. it gives an underestimate of the population [Option ID = 10334]
3. it is defined for female population only [Option ID = 10336]
4. it is defined for male population only [Option ID = 10335]

Correct Answer :-

- it gives an overestimate of the population [Option ID = 10333]

6) Let X_1, X_2, X_3 be random observations from a population with mean M. Some estimators of M are suggested below:
$T_1 = (X_1 - 2X_2)$, $T_2 = (2X_2 – X_3)$, $T_3 = (X_1 + X_2 + X_3)/3$, $T_4 = (X_1 + 3X_2 + X_3)/5$
Which of the above estimators are unbiased? [Question ID = 2587]

1. T_1 and T_2 only [Option ID = 10345]
2. T_1, T_2, T_3 and T_4 [Option ID = 10348]
3. T_3 and T_4 only [Option ID = 10346]
4. T_2, T_3 and T_4 only [Option ID = 10347]

Correct Answer :-

- T_1 and T_2 only [Option ID = 10345]

7) In a certain region the weather patterns have the following sequence. A day is described as sunny (S) if the sun shines for more than 50% of daylight hours and cloudy (C) if the sun shines for less than 50% of daylight hours. Data indicate that if it is cloudy one day then it is equally likely to be cloudy or sunny on the next day, if it is sunny today then there is a probability 1/3 that it is cloudy and 2/3 that it is sunny on the next day. If it is cloudy today, then the probability that it is cloudy in three days' time is

[Question ID = 2579]

1. 43/108 [Option ID = 10315]
2. 29/72 [Option ID = 10314]
3. 29/108 [Option ID = 10316]
4. 43/72 [Option ID = 10313]

Correct Answer :-

- 43/72 [Option ID = 10313]

8) A cohort life table records the survival experience of a group of individuals [Question ID = 2585]

1. for each year of age [Option ID = 10338]
2. for a short period of time [Option ID = 10337]
3. from birth till the death of last member of the group [Option ID = 10340]
4. for age intervals greater than 1 year [Option ID = 10339]

Correct Answer :-

- for a short period of time [Option ID = 10337]

9) Consider a 2^4 factorial experiment conducted in two blocks of size 8 each. If the contents of one of the blocks are a, c, d, ab, acd, bd, bc, abcd, the confounded interaction is [Question ID = 2595]

1. BCD [Option ID = 10380]
2. ABD [Option ID = 10377]
3. ACD [Option ID = 10378]
4. ABC [Option ID = 10379]

Correct Answer :-

- ABD [Option ID = 10377]

10) In estimating a parameter θ, U is an unbiased estimator of θ and T is a sufficient statistic. Consider the following statements:
1. E(U|T) is an unbiased estimator of θ which has a variance not exceeding the variance of U.
2. If T is completely sufficient, then E(U|T) is the unique UMVU estimator of θ.
Which of the above statements is/are correct? [Question ID = 2592]

1. 2 only [Option ID = 10366]
2. 1 only [Option ID = 10365]
3. Both 1 and 2 [Option ID = 10367]
4. Neither 1 nor 2 [Option ID = 10368]

Correct Answer :-

- 1 only [Option ID = 10365]

11) In case of 'exact identification' of a simultaneous equation model, the structural coefficients and the reduced form coefficients : [Question ID = 2571]

1. can not be determined uniquely. [Option ID = 10284]
2. are equal in number [Option ID = 10282]
3. are uncorrelated [Option ID = 10283]
4. are the same [Option ID = 10281]

Correct Answer :-

- are the same [Option ID = 10281]

12) Let $X_1, X_2, \ldots, X_n$ be a random sample of size n taken from the population, where pdf or pmf is f(x, θ). An estimator $T=T(X_1, X_2, \ldots, X_n)$ is said to be sufficient for θ if
1. The conditional distribution of $X_1, X_2, \ldots, X_n$ given T, is independent of θ.
2. It contains all the information in the sample about the parameter θ.
Which of the above is/are correct? [Question ID = 2590]

1. 2 only [Option ID = 10358]
2. 1 only [Option ID = 10357]
3. Both 1 and 2 [Option ID = 10359]
4. Neither 1 nor 2 [Option ID = 10360]

Correct Answer :-

- 1 only [Option ID = 10357]

13) The average number of samples required to declare a process out of statistical control, when the probability of a sample point falling between the control limits is half, is [Question ID =

2582]

1. 2 [Option ID = 10325]
2. 8 [Option ID = 10327]
3. 16 [Option ID = 10328]
4. 4 [Option ID = 10326]

Correct Answer :-

- 2 [Option ID = 10325]

14) Non-sampling errors are caused due to:
1. Response errors
2. Non-responses
3. Sampling method
4. Processing of data code
Which of the above statements are correct? [Question ID = 2600]

1. 1, 2 and 4 only [Option ID = 10400]
2. 2, 3 and 4 only [Option ID = 10399]
3. 1 and 2 only [Option ID = 10397]
4. 1 and 4 only [Option ID = 10398]

Correct Answer :-

- 1 and 2 only [Option ID = 10397]

15) For a two-way classified data with p levels of factor A, q levels of factor B and m observations per cell, the degrees of freedom for error sum of squares is [Question ID = 2596]

1. $(p-1)(q-1)$ [Option ID = 10381]
2. $mpq-1$ [Option ID = 10382]
3. $pq-1$ [Option ID = 10383]
4. $pq(m-1)$ [Option ID = 10384]

Correct Answer :-

- $(p-1)(q-1)$ [Option ID = 10381]

16) Let X, Y, Z are independent and identically distributed Uniform (0, 2) variates, then value of $E\left(\sqrt{\text{Max}(X,Y,Z)}\right)$, is:

[Question ID = 2554]

1. $\frac{2\sqrt{2}}{7}$ [Option ID = 10213]
2. $\frac{3\sqrt{2}}{7}$ [Option ID = 10214]
3. $\frac{\sqrt{2}}{7}$ [Option ID = 10216]

4. $\frac{6\sqrt{2}}{7}$ [Option ID = 10215]

Correct Answer :-

- $\frac{2\sqrt{2}}{7}$ [Option ID = 10213]

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17) If $\sum_1$ and $\sum_2$ are the two covariance matrices given by

$$\Sigma_1 = \begin{pmatrix} 14 & 8 & 3 \\ 8 & 5 & 2 \\ 3 & 2 & 1 \end{pmatrix} \text{ and } \Sigma_2 = \begin{pmatrix} 6 & 6 & 1 \\ 6 & 8 & 2 \\ 1 & 2 & 1 \end{pmatrix}$$

Which of the below is correct?

[Question ID = 2566]

1. $|\Sigma_1| > |\Sigma_2|$ and $trace(\Sigma_2) < trace(\Sigma_1)$ [Option ID = 10261]
2. $|\Sigma_2| > |\Sigma_1|$ and $trace(\Sigma_1) < trace(\Sigma_2)$ [Option ID = 10263]
3. $|\Sigma_2| > |\Sigma_1|$ and $trace(\Sigma_2) < trace(\Sigma_1)$ [Option ID = 10264]
4. $|\Sigma_1| > |\Sigma_2|$ and $trace(\Sigma_1) < trace(\Sigma_2)$ [Option ID = 10262]

Correct Answer :-

- $|\Sigma_1| > |\Sigma_2|$ and $trace(\Sigma_2) < trace(\Sigma_1)$ [Option ID = 10261]

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18) The joint probability density function of two random variables X and Y is:

$$f(x,y) = \begin{cases} \lambda x, & x > 0,\ y > 0,\ 2x + 3y < 1, \\ 0, & \text{otherwise.} \end{cases}$$

The value of $E(X|Y = 1/6)$ is:

[Question ID = 2556]

1. 1/6 [Option ID = 10223]
2. ½ [Option ID = 10221]
3. 1/3 [Option ID = 10222]
4. 1/9 [Option ID = 10224]

Correct Answer :-

- ½ [Option ID = 10221]

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19) For a general linear model $\underset{\sim}{Y} = X\underset{\sim}{\beta} + \underset{\sim}{u}$, an instrumental variable estimator $\hat{\underset{\sim}{b}}$ of $\underset{\sim}{\beta}$ is:

[Question ID = 2570]

1. another name for the Ordinary Least Square Estimator [Option ID = 10277]

2. is the Ordinary Least Square Estimator in the limit [Option ID = 10278]
3. is used when the Ordinary Least Square Estimator is not consistent. [Option ID = 10280]
4. used when the Ordinary Least Square Estimator is biased but consistent [Option ID = 10279]

Correct Answer :-

- another name for the Ordinary Least Square Estimator [Option ID = 10277]

20)

If $\underset{\sim}{y}$ and $\underset{\sim}{x}$ are sub-vectors, each of order 2x1, where $\begin{pmatrix} \underset{\sim}{y} \\ \underset{\sim}{x} \end{pmatrix}$ is $N_4\left(\underset{\sim}{\mu}, \Sigma\right)$ with

$$\underset{\sim}{\mu} = \begin{pmatrix} 2 \\ -1 \\ \hline 3 \\ 1 \end{pmatrix}, \Sigma = \left(\begin{array}{cc|cc} 7 & 3 & -3 & 2 \\ 3 & 6 & 0 & 4 \\ \hline -3 & 0 & 5 & -2 \\ 2 & 4 & -2 & 4 \end{array}\right)$$

Then $E\left(\underset{\sim}{y} \mid \underset{\sim}{x}\right)$ is given by

[Question ID = 2567]

1. $\begin{pmatrix} 3.25 \\ -3.75 \end{pmatrix} + \begin{pmatrix} -0.5 & 0.25 \\ 0.5 & 1.25 \end{pmatrix}\begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$ [Option ID = 10267]
2. $\begin{pmatrix} 2 \\ -1 \end{pmatrix} + \begin{pmatrix} -0.5 & 0.25 \\ 0.5 & 1.25 \end{pmatrix}\begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$ [Option ID = 10265]
3. $\begin{pmatrix} 3.25 \\ -3.75 \end{pmatrix} + \begin{pmatrix} -0.25 & 0.25 \\ 0.5 & -0.25 \end{pmatrix}\begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$ [Option ID = 10268]
4. $\begin{pmatrix} 2 \\ -1 \end{pmatrix} + \begin{pmatrix} 1.25 & 0.25 \\ 0.5 & 1.25 \end{pmatrix}\begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$ [Option ID = 10266]

Correct Answer :-

- $\begin{pmatrix} 2 \\ -1 \end{pmatrix} + \begin{pmatrix} -0.5 & 0.25 \\ 0.5 & 1.25 \end{pmatrix}\begin{pmatrix} x_1 \\ x_2 \end{pmatrix}$ [Option ID = 10265]

21) Under Type II censoring

1. Number of failures is fixed
2. Number of failures is random variable
3. Time t_o is fixed
4. Time t_o is a random variable

Which of the above is/are correct?

[Question ID = 2561]

1. Both 1 and 3 [Option ID = 10243]
2. Both 1 and 4 [Option ID = 10242]
3. Both 1 and 2 [Option ID = 10241]

4. Both 2 and 3 [Option ID = 10244]

Correct Answer :-

- Both 1 and 2 [Option ID = 10241]

22) Let $\{X_n, n \geq 1\}$ be a sequence of i.i.d. N(0, 1) random variables. Define, $55\,T = U^2 + V^2$, where $U = 1X_1 + 2X_2 + 3X_3 + 4X_4 + 5X_5$ and $V = 5X_6 + 4X_7 + 3X_8 + 2X_9 + 1X_{10}$, then the value of $E(\text{Sin}(T))$:

[Question ID = 2558]

1. 1/3 [Option ID = 10231]
2. 2/5 [Option ID = 10232]
3. Does not exist [Option ID = 10229]
4. ½ [Option ID = 10230]

Correct Answer :-

- Does not exist [Option ID = 10229]

23) Using Lahiri's Method to draw a sample of size n with probabilities proportional to X_i and with replacement, the probability of selecting ith unit $(i = 1,2,\dots,N)$ at any given draw is:

[Question ID = 2597]

1. $\frac{X_i}{N\bar{X}}$ [Option ID = 10387]
2. $\frac{X_i^2}{N\bar{X}}$ [Option ID = 10388]
3. $\frac{2}{N\bar{X}}$ [Option ID = 10386]
4. $\frac{1}{N\bar{X}}$ [Option ID = 10385]

Correct Answer :-

- $\frac{1}{N\bar{X}}$ [Option ID = 10385]

24) Let α denote the primitive root of GF(2^3),then which of the following is not an element of GF(2^3)?

[Question ID = 2593]

1. $\alpha^2 + \alpha + 1$ [Option ID = 10371]
2. $\alpha + 1$ [Option ID = 10370]
3. $\alpha^3 + 1$ [Option ID = 10372]

4. α^2 [Option ID = 10369]

Correct Answer :-

- α^2 [Option ID = 10369]

25) For a distributed lag model with the lag function

$$D(L) = 0.10 + 0.25L + 0.35L^2 + 0.15L^3 + 0.05L^4$$

the mean lag is

[Question ID = 2572]

1. 2 [Option ID = 10285]
2. 1.78 [Option ID = 10288]
3. 1.5 [Option ID = 10286]
4. 1.28 [Option ID = 10287]

Correct Answer :-
- 2 [Option ID = 10285]

26) In the general linear model $\underset{\sim}{Y} = X\underset{\sim}{\beta} + \underset{\sim}{u}$, if X is a matrix of stochastic variables which are independent of the error term $\underset{\sim}{u}$, then the Ordinary Least Square Estimator $\hat{\underset{\sim}{b}}$ of $\underset{\sim}{\beta}$:

[Question ID = 2569]

1. is consistent but not unbiased [Option ID = 10274]
2. does not exist [Option ID = 10275]
3. does not depend on the nature of independent variables. [Option ID = 10276]
4. is still unbiased and consistent [Option ID = 10273]

Correct Answer :-
- is still unbiased and consistent [Option ID = 10273]

27) Let $X_1, X_2, \ldots, X_n$ be a sample from $N(\mu, \sigma^2)$. Then consider the following statements:

1. The statistic $T(X_1, X_2, \ldots, X_n) = (\bar{X}, S^2)$ is jointly sufficient for (μ, σ^2).
2. $\bar{X}$ is not sufficient for μ when σ^2 is unknown.
3. S^2 is sufficient for σ^2 when μ is unknown

Which of the above statements are correct?

[Question ID = 2588]

1. 2 and 3 only [Option ID = 10351]
2. 1, 2 and 3 [Option ID = 10349]
3. 1 and 2 only [Option ID = 10350]
4. 1 and 3 only [Option ID = 10352]

Correct Answer :-
- 1, 2 and 3 [Option ID = 10349]

28) Let $\{X_n, n \geq 1\}$ be a Markov chain with state space S = {0,1}, initial distribution $\pi = (0.5, 0.5)$ and transition matrix $P = \begin{bmatrix} 0.1 & 0.9 \\ 0.3 & 0.7 \end{bmatrix}$. Then P ($X_3 = 0$) is

[Question ID = 2577]

1. 0.26 [Option ID = 10307]
2. 0.01 [Option ID = 10305]
3. 0.04 [Option ID = 10308]
4. 0.45 [Option ID = 10306]

Correct Answer :-

- 0.01 [Option ID = 10305]

29) For simple exponential smoothing of a time series $x_t = b + \varepsilon_t$, the estimate $\hat{b}_T$ of b at time T is

[Question ID = 2574]

1. consistent for b [Option ID = 10294]
2. needs an adjustment to be unbiased for b [Option ID = 10295]
3. needs an adjustment to be consistent for b [Option ID = 10296]
4. unbiased for b [Option ID = 10293]

Correct Answer :-

- unbiased for b [Option ID = 10293]

30) If $X_1, X_2, ..., X_n$ are n independent and identically distributed random variables with cumulative distribution function $F(x)$ and probability density function $f(x)$, then the density function of the range $W = X_{(n)} - X_{(1)}$, where $X_{(n)}$ and $X_{(1)}$ are the largest and the smallest order statistics, is given by

[Question ID = 2559]

1. $f(w) = n(n-1)\int_{-\infty}^{\infty} [F(x+w) - F(x)]^{n-2} f(x+w) f(x) dx,\ w > 0$ [Option ID = 10234]
2. $f(w) = n\int_{-\infty}^{\infty} [F(x+w) - F(x)]^{n-1} f(x+w) f(x) dx,\ w > 0$ [Option ID = 10235]
3. None of the above [Option ID = 10236]
4. $f(w) = n(n-1)\int_{0}^{\infty} [F(x+w) - F(x)]^{n-2} f(x+w) f(x) dx,\ w > 0$ [Option ID = 10233]

Correct Answer :-

- $f(w) = n(n-1)\int_{0}^{\infty} [F(x+w) - F(x)]^{n-2} f(x+w) f(x) dx,\ w > 0$ [Option ID = 10233]

31)

If $\underset{\sim}{X}_{\alpha}$, α=1(1)N are N independent observations from $N_p(\underset{\sim}{\mu}, \Sigma)$, $\bar{\underset{\sim}{X}} = \frac{1}{N}\sum_{\alpha=1}^{N}\underset{\sim}{X}_{\alpha}$, and $A = \sum_{\alpha=1}^{N}(\underset{\sim}{X}_{\alpha} - \bar{\underset{\sim}{X}})(\underset{\sim}{X}_{\alpha} - \bar{\underset{\sim}{X}})^T$, then the maximum value of the likelihood function is given by

[Question ID = 2565]

1. $\max L(\underset{\sim}{\mu}, \Sigma) = \dfrac{e^{-\frac{N}{2}}}{(2\pi)^{\frac{N}{2}}\left|\frac{A}{N}\right|^{\frac{Np}{2}}}$ [Option ID = 10259]
2. $\max L(\underset{\sim}{\mu}, \Sigma) = \dfrac{e^{-\frac{Np}{2}}}{(2\pi)^{\frac{N}{2}}\left|\frac{A}{N}\right|^{\frac{Np}{2}}}$ [Option ID = 10258]
3. $\max L(\underset{\sim}{\mu}, \Sigma) = \dfrac{e^{\frac{Np}{2}}}{(2\pi)^{\frac{N}{2}}\left|\frac{A}{N}\right|^{\frac{N}{2}}}$ [Option ID = 10257]
4. $\max L(\underset{\sim}{\mu}, \Sigma) = \dfrac{e^{-\frac{Np}{2}}}{(2\pi)^{\frac{Np}{2}}\left|\frac{A}{N}\right|^{\frac{N}{2}}}$ [Option ID = 10260]

Correct Answer :-

- $\max L(\underset{\sim}{\mu}, \Sigma) = \dfrac{e^{\frac{Np}{2}}}{(2\pi)^{\frac{N}{2}}\left|\frac{A}{N}\right|^{\frac{N}{2}}}$ [Option ID = 10257]

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32) If a function $g(\cdot)$ denotes a differentiable function such that, $g'(\mu) \neq 0$, then $Y \sim N\left(\mu, \frac{\sigma^2}{n}\right)$ implies

[Question ID = 2560]

1. $g(Y) \sim \left(g'(\mu), (g'(\mu))^2 \frac{\sigma^2}{n}\right)$ [Option ID = 10237]
2. $g(Y) \sim (g(\mu), (g(\mu))^2 \sigma^2)$ [Option ID = 10238]
3. $g(Y) \sim \left(g(\mu), (g(\mu))^2 \frac{\sigma^2}{n}\right)$ [Option ID = 10239]
4. None of these [Option ID = 10240]

Correct Answer :-

- $g(Y) \sim \left(g'(\mu), (g'(\mu))^2 \frac{\sigma^2}{n}\right)$ [Option ID = 10237]

33) Let $X_1, X_2, \ldots, X_n$ be n independent centered variates and $Var(X_k) = 1$. If $S_n = X_1 + X_2 + \ldots + X_n$ and $c > 0$, then the upper bound for probability $P\left(\max_{1 \le k \le n} |S_k| > c\right)$ using Kolmogov's Inequality is:

[Question ID = 2551]

1. n / c^2 [Option ID = 10204]
2. $1 / nc^2$ [Option ID = 10201]
3. n / c [Option ID = 10203]
4. $n / \sqrt{c}$ [Option ID = 10202]

Correct Answer :-

- $1 / nc^2$ [Option ID = 10201]

34) A population consists of N clusters with the ith cluster being of size $M_i (i = 1,2, \ldots, N)$. n clusters are drawn from N clusters by simple random sampling without replacement. If $\bar{y}_i (i = 1,2, \ldots, n)$ is the mean of the ith selected cluster, then $\hat{\bar{\bar{Y}}} = \frac{1}{n}\sum_{i=1}^{n} \bar{y}_i$ is

[Question ID = 2599]

1. an unbiased estimator of population mean [Option ID = 10394]
2. an unbiased estimator of population total [Option ID = 10395]
3. none of the above. [Option ID = 10396]
4. a biased estimator of population mean [Option ID = 10393]

Correct Answer :-

- a biased estimator of population mean [Option ID = 10393]

35) If, $(X, Y) \sim BVN(a, b, c^2, d^2; 2e)$, $-\frac{1}{2} < e < \frac{1}{2}$, then the value of $E\left(\cos\left(\frac{d(X-a)}{c(Y-b)}\right)\right)$ is:

[Question ID = 2555]

1. $e^{-\sqrt{1-e^2}} cos(2e)$ [Option ID = 10217]
2. $e^{-\sqrt{1-2e^2}} cos(2e)$ [Option ID = 10218]
3. $e^{\sqrt{1-4e^2}} cos(2e)$ [Option ID = 10220]
4. $e^{-\sqrt{1-4e^2}} cos(2e)$ [Option ID = 10219]

Correct Answer :-

- $e^{-\sqrt{1-e^2}} cos(2e)$ [Option ID = 10217]

36)

For a stationary time series $\{u_t; t = 0, 1, 2...\}$ with mean μ, define

$$M(u) = \lim_{t_1, t_2 \to \infty} \frac{1}{t_2 - t_1 + 1} \sum_{t=t_1}^{t_2} u_t; \; t_2 - t_1 + 1 \text{ being the size of the moving average.}$$

Then for $\{u_t; t = 0, 1, 2...\}$ to be an ergodic series

[Question ID = 2573]

1. $M(u) = \mu$ [Option ID = 10289]
2. $M(u) = e^{-\mu}$ [Option ID = 10290]
3. The coefficient of autocorrelation ρ must be equal to 1 [Option ID = 10291]
4. The coefficient of autocorrelation ρ must be equal to 0. [Option ID = 10292]

Correct Answer :-

- $M(u) = \mu$ [Option ID = 10289]

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37) If a random variable, where, $X \sim Negative\ exponential\ (\lambda)$, where $\lambda \sim gamma(a, k)$, then the compound distribution is given by

[Question ID = 2564]

1. Exponential [Option ID = 10253]
2. Gamma [Option ID = 10254]
3. Pareto [Option ID = 10255]
4. None of the above [Option ID = 10256]

Correct Answer :-

- Exponential [Option ID = 10253]

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38) Let X have a continuous distribution with mean μ. We make n observations $X_1, X_2, \ldots, X_n$ but note only $(Y_1, \ldots, Y_n)$, where $Y_i = 1$ or 0according as $X_i \leq \mu$ or $X_i > \mu$; i=1, 2,…,n. Then $\bar{Y} = \frac{\sum Y_i}{n}$ is

[Question ID = 2591]

1. UMVUE of 1/μ [Option ID = 10362]
2. UMVUE of P(X≤ μ) [Option ID = 10364]
3. UMVUE of μ [Option ID = 10361]
4. Unbiased for P(X≤ μ) but not a Minimum Variance Estimator [Option ID = 10363]

Correct Answer :-

- UMVUE of μ [Option ID = 10361]

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39) Let $\{X_n, n \geq 1\}$ be a sequence of independent and identically distributed standard exponential variates and $Y_n = \frac{X_1 + X_2 + \ldots + X_n}{\sqrt{n}}$. If $u(n, t) = \left(E\left(e^{tY_n}\right)\right)^{1/\sqrt{n}}$, then the value of $u(n, t)$ as $n \to \infty$, is:

[Question ID = 2553]

1. e^{t} [Option ID = 10210]
2. e^{-2t} [Option ID = 10211]
3. e^{-3t} [Option ID = 10212]
4. e^{-t} [Option ID = 10209]

Correct Answer :-

- e^{-t} [Option ID = 10209]

40) Let N denote the incidence matrix of a BIBD with parameters $v,\ b,\ r,\ k$ and λ, then the row sums of N are all equal to

[Question ID = 2594]

1. v [Option ID = 10376]
2. λ [Option ID = 10375]
3. r [Option ID = 10373]
4. k [Option ID = 10374]

Correct Answer :-

- r [Option ID = 10373]

41) Let $\{X_n, n \geq 1\}$ be a sequence of random variables, with

$$\text{Cov.}\left(X_i, 2X_j\right) = \begin{cases} 1, & i = j, \\ \frac{1}{2}, & i > j, \\ -\frac{1}{3}, & i < j. \end{cases}$$

Then the value of $\text{Var.}\left(X_1 + X_2 + ... + X_n\right)$, when $n = 37$ is:

[Question ID = 2557]

1. 30 [Option ID = 10226]
2. 74 [Option ID = 10228]
3. 37 [Option ID = 10227]
4. 25 [Option ID = 10225]

Correct Answer :-

- 25 [Option ID = 10225]

42) If the random variable X follows exponential distribution then the $P(X > t+x \mid X > t)$ is given by

[Question ID = 2563]

1. $P(X > t)$ [Option ID = 10251]

2. $P(X > t + x)$ [Option ID = 10250]
3. $P(X > x)$ [Option ID = 10249]
4. None of these [Option ID = 10252]

Correct Answer :-

- $P(X > x)$ [Option ID = 10249]

43) If $V_{prop}(\bar{y}_{st})$ is the variance of the estimated mean from a stratified random sample of size n with proportional allocation and $V(\bar{y})$ is the variance of the mean from a simple random sample of size n, then the ratio $V_{prop}(\bar{y}_{st})/V(\bar{y})$

[Question ID = 2598]

1. depends on the values of the sample [Option ID = 10390]
2. depends on the size of the sample [Option ID = 10389]
3. none of these [Option ID = 10392]
4. does not depend on the size of the sample [Option ID = 10391]

Correct Answer :-

- depends on the size of the sample [Option ID = 10389]

44) Let $\{X_n, n \geq 1\}$ be a sequence of independent Bernoulli (θ) variates. If for some large value of n the expression $\sum_{i=1}^{n} X_i \sim N(100, 50)$, then value of θ, is:

[Question ID = 2552]

1. 0.5 [Option ID = 10206]
2. 0.05 [Option ID = 10207]
3. 0.95 [Option ID = 10205]
4. 0.005 [Option ID = 10208]

Correct Answer :-

- 0.95 [Option ID = 10205]

45) The OC function of a single sampling plan with N=1000, n=89, c=2, p=0.01 is [Question ID = 2581]

1. 0.94 [Option ID = 10323]
2. 0.95 [Option ID = 10324]
3. 0.93 [Option ID = 10322]
4. 0.92 [Option ID = 10321]

Correct Answer :-

- 0.92 [Option ID = 10321]

46) A mobile phone manufacturing company purchases phone batteries in lots of 1000 batteries each. The lots are accepted up to quality level 0.05 and rejected at more than quality level 0.20. Acceptance sampling plan is based on a sample of size 25 from each lot and the lot is accepted if

the inspected sample contains at the most one defective battery, otherwise rejected. The consumer risk is [Question ID = 2583]

1. 0.025 [Option ID = 10329]
2. 0.027 [Option ID = 10331]
3. 0.026 [Option ID = 10330]
4. 0.028 [Option ID = 10332]

Correct Answer :-

- 0.025 [Option ID = 10329]

47) Customers arrive at a store according to a Poisson process of rate 4 per hour. Given that the store opens at 9 a.m., what is the probability that exactly one customer has arrived by 9.30 a.m. and a total of 5 have arrived by 11.30 a.m.? [Question ID = 2575]

1. 0.030 [Option ID = 10298]
2. 0.015 [Option ID = 10297]
3. 0.001 [Option ID = 10299]
4. 0.003 [Option ID = 10300]

Correct Answer :-

- 0.015 [Option ID = 10297]

48) The statements below relate to a sufficient statistic based on 'n' random observations from a uniparametric family of distributions.
1. A sufficient statistic is unique.
2. If T_1 and T_2 are sufficient statistics, then each is linear function of the other.
3. If T is sufficient and f(T) is a one-one function of T, then f(T) is also sufficient.
Which of the above statements is/are correct?

[Question ID = 2589]

1. 2 only [Option ID = 10354]
2. 1 only [Option ID = 10353]
3. 3 only [Option ID = 10355]
4. 1, 2 and 3 [Option ID = 10356]

Correct Answer :-

- 1 only [Option ID = 10353]

49) The reliability of a parallel system can be improved by improving the reliability of its

[Question ID = 2586]

1. weakest component [Option ID = 10341]
2. none of these [Option ID = 10344]
3. best component [Option ID = 10342]
4. best as well as weakest component [Option ID = 10343]

Correct Answer :-

- weakest component [Option ID = 10341]

50) The cumulative distribution function of the smallest order statistic is given by [Question ID = 2562]

1. $1-\left[1-F(x)\right]^{n}$ [Option ID = 10248]
2. $1-\left[F(x)\right]^{n}$ [Option ID = 10246]
3. $\left[F(x)\right]^{n}$ [Option ID = 10245]
4. $\left[1-F(x)\right]^{n}$ [Option ID = 10247]

Correct Answer :-

- $\left[F(x)\right]^{n}$ [Option ID = 10245]