No. of Pages. 24

Code No.	Y – 3054

Register Number : **Time : 2 Hours**

Name : **Max.Marks : 100**

Entrance Examination for Admission to the P.G. Courses in the Teaching Departments, 2026

CSS

STATISTICS/APPLIED STATISTICS AND DATA ANALYTICS

GENERAL INSTRUCTIONS

1. The Question Paper is having 100 Objective Questions, each carrying one mark.
2. The answers are to be marked **only** in the "**OMR Sheet**" provided.
3. **Negative marking** : **0.25 marks** will be deducted for each wrong answer .

INSTRUCTIONS FOR FILLING THE OMR SHEET

- The OMR sheet should not be folded or crushed.
- Use only blue/black ball point pen to fill the circles.
- Use of pencil is strictly prohibited.
- Circles should be darkened completely and properly.
- Cutting and erasing on this sheet is not allowed.
- Do not leave any stray marks on the sheet.
- Do not use marker or white fluid to hide the mark.
- WRONG METHODS

CORRECT METHOD

DO NOT WRITE HERE

Choose appropriate answer from the options in the questions.

(100 $\times$ 1 = 100 marks)

1. In a bar graph, the height of the bars represents

   A. Frequency B. Time intervals

   C. Percentages only D. Labels

2. Which graph would you use to display continuous data grouped into intervals?

   A. Pie chart B. Histogram

   C. Bar graph D. Pictograph

3. Which graph is most appropriate to show the relationship between two variables?

A. Pie chart B. Scatter plot

C. Histogram D. Deviation diagram

4. The absolute value of a real number a, denoted by $|a|$, is defined by

A. $|a| = \begin{cases} a, & \text{if } a > 0, \\ 0, & \text{if } a = 0, \\ -a, & \text{if } a < 0. \end{cases}$

B. $|a| = \begin{cases} a, & \text{if } a < 0, \\ 0, & \text{if } a = 0, \\ -a, & \text{if } a > 0. \end{cases}$

C. $|a| = \begin{cases} a, & \text{if } a > 0, \\ 0, & \text{if } a = 0, \\ -a, & \text{if } a \neq 0. \end{cases}$

D. $|a| = \begin{cases} a, & \text{if } a \neq 0, \\ 0, & \text{if } a = 0, \\ -a, & \text{if } a < 0. \end{cases}$

5. If a and b are positive real numbers, then their arithmetic mean is $\frac{a+b}{2}$ and their geometric mean is $\sqrt{ab}$. The Arithmetic-Geometric Mean Inequality for a, b is

A. $\sqrt{ab} = \frac{a+b}{2}$

B. $\sqrt{ab} \geq \frac{a+b}{2}$

C. $\sqrt{ab} \leq \frac{a+b}{2}$

D. $ab \leq \frac{a+b}{2}$

6. Coefficient of variation is defined as

A. $\frac{\text{Standard deviation}}{\text{Arithmatic mean}}$

B. $\frac{\text{Geometric mean}}{\text{Arithmetic mean}}$

C. $\frac{\text{Arithmetic mean}}{\text{Standard deviation}}$

D. $\frac{\text{Standard deviation}}{\text{Harmonic mean}}$

7. The arithmetic mean of two numbers is 13 and their geometric mean is 12. Then the numbers are ————

A. 18, 6 B. 9, 4

C. 5, 6 D. 18, 8

8. The arithmetic mean of two numbers is 13 and their geometric mean is 12. Then harmonic mean is

A. 12.023 B. 11.077

C. 10.236 D. 9.032

9. The positional average is

A. Mode B. Mean

C. Median D. Geometric mean

10. The export of agricultural products in million dollars from a country was, 29.7, 16.6, 2.3, 14.1, 36.6, 18.7, 3.5, 21.3. Then the median is

A. 29 B. 14

C. 16 D. 17.65

11. The following nine measurements are the heights in inches in a sample of nine soldiers: 69, 66, 67, 69, 64, 63, 65, 68, 72. Then the sample variance of heights of soldiers is

A. 6 B. 7

C. 8 D. 10

12. The average weekly salary of male employees in a firm was Rs. 5200 and that of female was Rs.4,200. The mean salary of all the employees was Rs. 5000, then the percentage of female employees is

A. 20 B. 80

C. 30 D. 40

13. A cyclist pedals from his house to his college at a speed of 10 km.p.h. and back from the college to his house at 15 km.p.h. Then the average speed is

A. 10 km.p.h B. 12 km.p.h

C. 14 km.p.h D. 13 km.p.h

14. A and B are two independent events with equal probabilities. If $P(A \cup B) = 0.75$, then $P(A) = P(B) =$

A. $\frac{1}{4}$

B. $\frac{3}{4}$

C. $\frac{1}{2}$

D. 1

15. The probability that at least one of A and B occurs is 0.9 and the probability that both A and B occur is 0.4. The probability that at most one of A and B occurs is

A. 0.6

B. 0.5

C. 0.4

D. Cannot be determined from the given data

16. Let A and B be two events such that $P(A) = \frac{1}{4}, P(B) = \frac{1}{3}$ and $P(A \cap B) = \frac{1}{12}$. If

(i) $P(A \cap \overline{B}) = \frac{1}{4}$

(ii) $P(\overline{A} \cap \overline{B}) = \frac{1}{2}$

(iii) $P(B \mid \overline{A}) = \frac{1}{3}$

A. both (ii) and (iii) are true

B. both (i) and (ii) are true

C. both (i) and (iii) are true

D. All are true

17. A person goes to work by using three routes. The probabilities that he arrives on time using routes I, II and III are 50%, 65% and 71% respectively. If he is equally likely to choose any of the routes, and arrives at work on time, then the probability of choosing route I is

A. 32.3%

B. 26.9%

C. 45.7%

D. 56.2%

18. The adjoint of the matrix $Q = \begin{bmatrix} 2 & 5 & 3 \\ 3 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix}$

A. $\frac{1}{4}\begin{bmatrix} 2 & 3 & 1 \\ 5 & 1 & 2 \\ 3 & 2 & 1 \end{bmatrix}$

B. $\frac{1}{4}\begin{bmatrix} -3 & 1 & 7 \\ -1 & -1 & 5 \\ 5 & 1 & -13 \end{bmatrix}$

C. $\frac{1}{8}\begin{bmatrix} -2 & 5 & 3 \\ 3 & -1 & 2 \\ 1 & -2 & 1 \end{bmatrix}$

D. $\frac{1}{8}\begin{bmatrix} 3 & -5 & 3 \\ 3 & 1 & -2 \\ 1 & 2 & 1 \end{bmatrix}$

19. The determinant of the matrix $Q = \begin{bmatrix} x & \sin\theta & \cos\theta \\ -\sin\theta & -x & 1 \\ \cos\theta & 1 & x \end{bmatrix}$

A. $-x^3$

B. x^3

C. $2\sin\theta\cos\theta$

D. $x^3 - 2\sin\theta\cos\theta$

20. The eigen values of the matrix $M = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 6 \\ 3 & 6 & 9 \end{bmatrix}$

A. 1, 4, 9

B. 0, 7, 7

C. 0, 1, 13

D. 0, 0, 14

21. The rank of the matrix $P = \begin{bmatrix} 6 & 1 & 3 & 8 \\ 4 & 2 & 6 & -1 \\ 10 & 3 & 9 & 7 \\ 16 & 4 & 12 & 15 \end{bmatrix}$

A. 4

B. 3

C. 2

D. 1

22. The characteristic equation of the matrix $Q = \begin{bmatrix} 1 & 3 & 2 \\ 3 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

A. $Q^3 - Q^2 - 10Q + 10 = 0$

B. $Q^3 + Q^2 + 10Q + 10 = 0$

C. $Q^3 + Q^2 - 10Q - 10 = 0$

D. $Q^3 - 10Q^2 + Q - 10 = 0$

23. Cayley-Hamilton theorem states that:

A. Every bounded sequence has a convergent subsequence

B. Every matrix satisfies its own characteristic equation

C. Every square matrix satisfies its own characteristic equation

D. None of the above

24. The solution of the differential equation $\frac{dy}{dx} = (\log x)y + x^x$ is

A. $y = x^x\left(1 + ce^{-x}\right)$

B. $y = x^x\left(1 - ce^{-x}\right)$

C. $y = x^{2x}\left(1 + 2ce^{-x}\right)$

D. $y = x^{3x}\left(1 + ce^{-x}\right)$

25. The directional derivatives of $f(x, y) = x^2 + y^2$ at the point (1, 1) in the direction of the vector (3, 4) is

A. 10

B. 2

C. $\frac{14}{5}$

D. 4

26. For SRSWOR, the variance of the sample mean is

A. $\frac{N-1}{N}\frac{S^2}{n}$

B. $\frac{N-n}{N}\frac{S^2}{n}$

C. $\frac{N-n}{N-1}\frac{S^2}{n}$

D. $\frac{N}{N-n}\frac{S^2}{n}$

27. For a population of size N = 100 and a sample of size n = 3 drawn with replacement, the expected number of distinct units in the sample is approximately

A. 4
B. 2.97
C. 2.50
D. 1

28. If N is the size of the population and n is size of sample, then sampling fraction is:

A. n^N
B. N^n
C. $\frac{n}{N}$
D. N^{2n}

29. The Karl-Pearson correlation coefficient measures:

A. The degree of positive relation between two variables only
B. The degree of negative relation between two variables only
C. The degree of linear relation between two variables
D. The degree of curvilinear relation between two variables

30. If r is the correlation coefficient and b_{yx} and b_{xy} are two regression coefficients. Then

A. $r = \pm\sqrt{b_{yx}b_{xy}}$
B. $r = b_{yx}b_{xy}$
C. $r = -b_{yx}b_{xy}$
D. $r = \pm b_{yx}\sqrt{b_{xy}}$

31. The range of multiple correlation coefficient R is

A. $0 \le R \le 1$
B. $-1 \le R \le 1$
C. $R \ge 1$
D. $R > 1$

32. A researcher develops a linear regression model to predict student's final exam scores based on their hours of study, attendance rate, and homework completion. The model produces R^2 value as 0.87. What does this R^2 value indicate about the regression model?

A. The model explains 87% of the variation in final exam scores
B. The model is not useful because 87% of the predictions are incorrect
C. 87% of the students scored exactly what the model predicted
D. The model explains 13% of the variation in study habits

33. Correlation coefficient is unaffected by

A. Change of origin only

B. Both change of origin and change of scale

C. Change of scale only

D. None of the above

34. If $x \geq 1$ is the critical region for testing $H_0 : \theta = 2$ against $H_1 : \theta = 1$, on the basis of the single observation from the population, $f(x, \theta) = \theta e^{-\theta x}, 0 \leq x < \infty$. Then P (Type-I error) is

A. $\frac{1}{e^2}$ B. $\frac{1}{e}$

C. e D. e^2

35. If $x \geq 1$ is the critical region for testing $H_0 : \theta = 2$ against $H_1 : \theta = 1$, on the basis of the single observation from the population, $f(x;\theta) = \theta e^{-^{\theta x}}, 0 \leq x < \infty$. Then power of the test is

A. $\frac{1}{e^2}$ B. $\frac{1}{e}$

C. e D. e^2

36. The Neyman Pearson Lemma gives:

A. The most powerful test of simple hypothesis against a simple alternative hypothesis

B. The uniformly most powerful test of simple hypothesis against a simple alternative hypothesis

C. Unbiased test

D. Test with Neyman structure

37. Under H_0 the test statistic for testing the mean of a normal population with known variance σ^2 is

A. $Z = \frac{\overline{X} - \sigma_0}{\frac{\sigma}{\sqrt{n}}} \sim N(0, 1)$ B. $Z = \frac{\overline{X} - \mu_0}{\sqrt{n}} \sim N(0, 1)$

C. $Z = \frac{\overline{X} - \mu_0}{\sigma} \sim N(0, 1)$ D. $Z = \frac{\overline{X} - \mu_0}{\frac{\sigma}{\sqrt{n}}} \sim N(0, 1)$

38. For a given H_0, the test statistics $\chi^2 = \frac{ns^2}{\sigma_0^2}$ follows:

A. χ^2 distribution with $(n-2)\,df$.

B. χ^2 distribution with $(n-1)\,df$.

C. χ^2 distribution with $(3n-2)\,df$.

D. χ^2 distribution with $(3n-1)\,df$.

39. Let p be the probability that a coin will fall head in a single toss in order to test $H_0 : p = \frac{1}{2}$ against $H_1 : p = \frac{3}{4}$. The coin is tossed 5 times and H_0 is rejected if more than 3 heads are obtained. The P (Type I error) is

A. $\frac{2}{8}$

B. $\frac{4}{8}$

C. $\frac{3}{8}$

D. $\frac{3}{16}$

40. Evaluate $\lim_{(x,\, y)\to(0,\, 0)} \frac{x^2 y}{x^2 + y^2}$

A. 0

B. 1

C. Does not exist

D. Depends on path

41. Given observations from $U : (0, \theta)$: 2, 5, 7, 3 Then the MLE of θ is

A. 5

B. 8

C. 7

D. 10

42. Suppose $X_1, X_2, \cdots, X_n$ are i.i.d. $N(\mu, \sigma^2)$ with both μ and σ^2 unknown. To test $H_0 : \mu = \mu_0$ vs. $H_1 : \mu \neq \mu_0$, the Likelihood Ratio Test (LRT) statistic is asymptotically equivalent to:

A. One-sample t-test statistic

B. Two-sample t-test statistic

C. F-test statistic

D. Chi-square test statistic with 2 d.f.

43. Evaluate $\int_0^{\infty} \frac{e^{-x} - e^{-2x}}{x} dx$

A. 2

B. 1

C. $ln\frac{3}{2}$

D. $ln 2$

44. A sequence of estimators $\left(\hat{\theta}_n^{(1)}, \hat{\theta}_n^{(2)}\right)$ is said to be jointly consistent for (θ_1, θ_2) if:

A. Each component estimator is unbiased

B. Each component estimator is consistent individually

C. $\left(\hat{\theta}_n^{(1)}, \hat{\theta}_n^{(2)}\right) \xrightarrow{p} (\theta_1, \theta_2)$

D. $\hat{\theta}_n^{(1)} + \hat{\theta}_n^{(2)} \xrightarrow{p} \theta_1 + \theta_2$

45. In the case of testing the mean of a normal distribution with known variance, the two-sided Z-test is:

A. Biased

B. Unbiased

C. Consistent but biased

D. Neither consistent nor unbiased

46. For large n, the variance of Kendall's Tau under the null hypothesis H_0 is approximately:

A. $\frac{2(2n+5)}{9n(n-1)}$

B. $\frac{n+1}{3(n-1)}$

C. $\frac{1}{n}$

D. $\frac{1}{n-1}$

47. How many entries can be chosen independently in a skew-symmetric matrix of order n?

A. $\binom{n+1}{2}$

B. $\binom{n}{2}$

C. $\binom{n-1}{2}$

D. $\frac{n+1}{2}$

48. A random variable X is said to have a symmetric about a point α if

A. $P(X > \alpha + x) = P(X \leq \alpha - x)$ for all x

B. $P(X > \alpha + x) = P(X < \alpha - x)$ for all x

C. $P(X \geq \alpha + x) = P(X \leq \alpha - x)$ for all x

D. $P(X > \alpha + x) = P(X > \alpha - x)$ for all x

49. Let $X_1, X_2 \cdots$ be iid N (1, 1) random variables. Let $S_n = \sum_{i=1}^{n} X_i^2$ for $n \geq 1$. Then

$\lim_{n \to \infty} \frac{Var\,(S_n)}{n}$

A. 4

B. 6

C. 1

D. 0

50. Let $X_1, X_2, \cdots, X_n$ be a random sample from uniform distribution $[\theta - 1, \theta + 1]$. Then MLE of θ is

A. $\min X_i$

B. $\max X_i$

C. $\max X_i + 1$

D. $\frac{\min X_i + \max X_i}{2}$

51. $(\cos\theta + i\sin\theta)^n =$

A. $\cos n\theta + i\sin n\theta$

B. $\cos\theta + i\sin n\theta$

C. $\cos n\theta + i\sin\theta$

D. $\cos n\theta - i\sin n\theta$

52. If r $\in$, $\mathbb{R}$ $r \neq 1$ and $n \in \mathbb{N}$, then $1 + r + r^2 + \cdots + r^n =$

A. $\frac{1-r^{n+1}}{1+r}$

B. $\frac{1+r^{n+1}}{1-r}$

C. $\frac{1-r^{n+1}}{1-r}$

D. $\frac{1-r^{n}}{1-r}$

53. If $x > -1$, then for all $n \in \mathbb{N}$

A. $(1+x)^n \leq 1+nx$

B. $(1+x)^n \geq 1+nx$

C. $(1+x)^n \neq 1+nx$

D. $(1+x)^n = 1+nx$

54. The unit interval [0,1] is

A. Countable

B. Not countable

C. Denumerable

D. Countably infinite

55. If x and y are real numbers with $x < y$, then there exist a rational number $r \in \mathbb{Q}$ such that

A. $y < r < x$

B. $y > r > x$

C. $x > r > y$

D. $x < r < y$

56. If X is a continuous random variable with cumulative distribution function $F(x)$, then the distribution of $F(x)$ is

A. $N(\mu, \sigma)$

B. $\beta(1, n+1)$

C. *Gamma* (p)

D. $U[0,1]$

57. In how many can 5 letters be posted in 3 post boxes?

A. 3^5

B. 3!

C. 5!

D. 5^3

58. If $X_1, X_2, \cdots, X_n$ is a random sample for $U[0,1]$, then the distribution of $Max(X_1, X_2, \cdots, X_n)$ is

A. $\beta(n, 1)$

B. $\beta(1, n+1)$

C. $\beta(n+1, 1)$

D. $\beta(1, n)$

59. Let X follows a Cauchy distribution with pdf $f(x) = \frac{1}{\pi(1+x^2)}, -\infty < x < \infty$. Then

A. $E|X|$ is finite

B. $E|X|$ is not finite

C. $E|X| = \pi$

D. $E|X| = 0$

60. Consider the pmf $P(X = k) = pq^k, k = 0, 1, \cdots, \; 0 < p < 1, \; p + q = 1$. Then the probability generating function is

A. $\frac{p}{1-s}$

B. $\frac{q}{1-ps}$

C. $\frac{p}{1-qs}$

D. 0

61. Let X and Y be independent random variables with pmf's $P(\lambda_1)$ and $P(\lambda_2)$ respectively. Then the conditional distribution of $X/X+Y$ is

A. $B\left(n, \frac{\lambda_1}{\lambda_1+\lambda_2}\right)$

B. $B\left(n, \frac{\lambda_2}{\lambda_1+\lambda_2}\right)$

C. $B\left(n, \frac{\lambda_2}{\lambda_1}\right)$

D. $P\left(\frac{\lambda_1}{\lambda_1+\lambda_2}\right)$

62. In a Poisson distribution with unit mean, mean deviation about mean is

A. $\frac{e}{2}SD$

B. $\frac{2}{3e}SD$

C. $\frac{4}{e}SD$

D. $\frac{2}{e}SD$

63. The distribution which possess lack of memory property is

A. Pareto

B. Weibul

C. Longnormal

D. Exponential

64. If $X \sim U(0, 1)$, then $-\log(1-X)$ has

A. Uniform distribution

B. Standard exponential distribution

C. Long normal distribution

D. Logistic distribution

65. Let X be a random variable having Poisson distribution. If $P(X=2)=P(X=3)$. Then $P(X=1)$ equals

A. $3e^{-3}$

B. $4e^{-4}$

C. $3e^{-4}$

D. e^{-3}

66. If $X \sim \beta(\alpha, \beta)$, then $1 - X$ follows :

A. $\beta(\alpha, \beta)$

B. $\beta(\alpha+\beta, \beta)$

C. $\beta(\beta, \alpha)$

D. $\beta(\alpha, \alpha+\beta)$

67. Crude death rate is defined as

A. $\text{CDR} = \dfrac{\text{Total live births}}{\text{Total mid year population}} \times 100$

B. $\text{CDR} = \dfrac{\text{Total deaths}}{\text{Total mid year population}} \times 100$

C. $\text{CDR} = \dfrac{\text{Total live births}}{\text{Total mid year population}} \times 1000$

D. $\text{CDR} = \dfrac{\text{Total deaths}}{\text{Total mid year population}} \times 1000$

68. The total number of deaths within a specific age group divided by the population of that same group is defined as

A. Fertility rate

B. Mortality rate

C. Crude birth rate

D. Age-specific death rate

69. Let X be a non-negative random variable with cumulative distribution function $F(x)$. Then $E(X)$.

A. $E(X) = \int_0^\infty \left[1 - F^2(x)\right] dx$

B. $E(X) = \int_0^\infty [F(x) - 1]\, dx$

C. $E(X) = \int_0^\infty [1 - F(x)]\, dx$

D. $E(X) = \int_0^\infty [1 - F(x)]^2 dx$

70. Which test is used to check stationarity?

A. T-test

B. Chi-square test

C. Augmented Dickey-Fuller test

D. Z-test

71. What is a time series?

A. Data collected at random intervals

B. Data collected over time in sequential order

C. Data collected only once

D. Crow-sectional data

72. If the two regression lines are perpendicular, then the relation between regression coefficient is

A. $b_{yx} = b_{xy}$

B. $b_{yx} b_{xy} = 1$

C. $b_{yx} + b_{xy} = 1$

D. $b_{yx} + b_{xy} = 0$

73. If each value of a series is multiplied by 2, the coefficient of variation of the resulting series is

A. Multiplied by 2

B. Divided by 2

C. Unaltered

D. Added by 2

74. If X and Y are uncorrelated variables with 0 mean and unit variances. Then the correlation coefficient between $X + Y$ and $X - Y$ is

A. 1/2

B. 0

C. –1/2

D. 1/3

75. $\lim \left(\frac{\sin n}{n} \right) =$

A. e

B. $\log e$

C. 1

D. 0

76. $\lim \left(\frac{2n+1}{n+5}\right) =$

A. 0
B. 2
C. 1
D. 5

77. $\lim_{x \to 0} \frac{\sqrt{4+x}-2}{x} =$

A. 4
B. 2/3
C. 1/2
D. 1/4

78. $\lim_{x \to 0} x \sin\frac{1}{x} =$

A. 0
B. 1
C. $\sin x$
D. x

79. Which test is used for testing goodness of fit?

A. Run test
B. Sign test
C. Wilcoxon test
D. Kolmogorov-Smirnov test

80. Which test is used for testing randomness?

A. Run test
B. t-test
C. Kolmogorov-Smirnov test
D. Chi-square test

81. A fair six-sided die is thrown once. Let X be the number appearing on the die. Then $E[X]$ is

A. 3
B. 3.5
C. 2
D. 1

82. Suppose X is a degenerate random variable, degenerate at c, then the characteristic function $\phi(t)$ is

A. $e^{it\mu}$

B. e^{t}

C. e^{it}

D. e^{itc}

83. Which index number is an ideal index number?

A. Laspeyre's index

B. Paasche's index

C. Fisher's ideal index

D. None of the above

84. Consumer Price Index (CPI) is also called:

A. Wholesale price index

B. Value index

C. Cost of living index

D. Quantity index

85. An index number that measures changes in price levels over time is called:

A. Quantity index

B. Price index

C. Value index

D. Time index

86. If $x_1, x_2, \cdots, x_n$ is a random sample from a normal population $N(\mu, 1)$, then $t = \frac{1}{n}\sum_{i=1}^{n} x_i^2$ is an unbiased estimator of

A. $\mu^2 + 2$

B. μ

C. μ^2

D. $\mu^2 + 1$

87. If T is an unbiased estimator of θ, then T^2 is

A. unbiased estimator of θ^2

B. biased estimator of θ^2

C. unbiased estimator of θ^2+1

D. biased estimator of θ^2+1

88. If $x_1, x_2, \cdots, x_n$ is a random sample from a Bernoulli distribution with parameter p, then

A. $\bar{x}(1-\bar{x})$ is a consistent estimator of $p(1-p)$

B. $\bar{x}(1-\bar{x})$ is a consistent estimator of $p^2(1-p)$

C. $\bar{x}(1-\bar{x})$ is a consistent estimator of $p(1-p^2)$

D. $\bar{x}(1-\bar{x})$ is a consistent estimator of $p^2(1-p^2)$

89. If T is a sufficient estimator for the parameter θ and if $\psi(T)$ is a one to one function $o\,T$, the $\psi(T)$ sufficient for

A. $\psi(\theta)$

B. $\psi(\theta)^2$

C. $\psi(\theta^2+1)$

D. $\psi(\theta+1)$

90. Cramer-Rao lower bound gives

A. UMVUE

B. Lower bound for the variance of a biased estimator

C. Upper bound for the variance of a biased estimator

D. Lower bound for the variance of an unbiased estimator

91. Let $X_1, X_2, \cdots, X_n$ be independent random variables each uniform on $[0, \theta]$, where $\theta > 0$. Then complete and sufficient statistic for θ is

A. $\min(X_1, X_2, \cdots, X_n)$

B. $\sum_{i=1}^{n} X_i$

C. $\prod_{i=1}^{n} X_i$

D. $\max(X_1, X_2, \cdots, X_n)$

92. Let $X_1, X_2, \cdots, X_n$ be a random sample from a normal distribution with mean μ and variance σ^2. Define $\overline{X} = \frac{1}{n} \sum_{i=1}^{n} X_i$, $S^2 = \frac{1}{n-1} \sum_{i=1}^{n} (X_i - \overline{X})^2$. Consider the following statements.

a. $\overline{X}$ and S^2 are independent

b. S^2 is a biased estimator of σ^2

Which one of the following is true?

A. (a) only

B. (b) only

C. Both (a) and (b)

D. Neither (a) nor (b)

93. For *n* events $A_1, A_2, \cdots, A_n$,

(i) $P\left(\bigcap_{i=1}^{n} A_i\right) \geq \sum_{i=1}^{n} P(A_i) - (n-1)$

(ii) $P\left(\bigcup_{i=1}^{n} A_1\right) \leq \sum_{i=1}^{n} P(A_i)$

Which one of the following is true?

A. (i) only

B. (ii) only

C. Both (i) and (ii)

D. Neither (i) nor (ii)

94. If a population consist of 10 units and SRSWOR is adopted, the probability of selecting a specified sample of 2 units is

A. 1/10

B. 1/45

C. 1/90

D. 1/100

95. The following layout.

A	*B*	*C*	*D*
A	*C*	*B*	*D*
B	*A*	*C*	*C*
A	*A*	*B*	*C*

meets the requirements of a:

A. Completely Randomized Design

B. Randomized Block Design

C. Latin Square Design

D. Factorial Design

96. Which one belongs to the principles of an experimental design?

A. ANOVA

B. Local control

C. MANOVA

D. CRD

97. A coin is tossed until a head appears, then the expected number of tosses required is

A. 3

B. 1

C. 2

D. 4

98. If $X \sim B(n, P)$. Then the distribution of $n - X$ is

A. $B(n, p)$

B. $B(n, 1-p)$

C. $B(n+1, p)$

D. $B(n+1, p-1)$

99. Let A be an $n \times n$ matrix, both Hermitian and unitary, then

A. $A^2 = I$

B. A is a real matrix

C. Eigen value of A are 0,1, –1

D. Characteristic and minimal polynomial are equal

100. Let P and Q be square matrices such that $PQ = I$, then 0 is an eigen values of

A. P but not Q

B. Q but not P

C. Both P and Q

D. Neither P nor Q

ROUGH WORK

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