STATISTICS
(FINAL)

1. If A is a 3×3 idempotent matrix with determinant value 3 then the determinant value of A^2 is

(A) 3
(B) 9
(C) 27
(D) 81

2. Which of the following are linearly independent set of vectors?

(A) (1, 1, 0), (0, 1, 1), (1, 2, 1)
(B) (2, 0, 0), (0, 3, 0), (0, 0, 4)
(C) (1, 1, 1), (2, 2, 2), (3, 3, 3)
(D) (1, −1, 0), (−1, 1, 0), (0, 0, 0)

3. For a given orthogonal matrix A, we have the following statements

(i) A' is also orthogonal
(ii) A^{-1} is also orthogonal
(iii) $|A|$ is also orthogonal

(A) (i),(ii) and (iii) are true
(B) (i) and (ii) alone are true
(C) (ii) and (iii) alone are true
(D) (i) and (iii) alone are true

4. A box contains 3 blue and 2 red marbles while another box contains 2 blue and 5 red marbles. A marble drawn at random from one of the boxes, if turns out to be blue, what is the probability that it came from the first box?

(A) $\frac{2}{5}$
(B) $\frac{3}{5}$
(C) $\frac{4}{7}$
(D) $\frac{3}{12}$

5. The probability of getting identical faces while throwing three dice is

(A) $\frac{1}{36}$
(B) $\frac{1}{6}$
(C) $\frac{1}{216}$
(D) 0

6. A five-figure number is formed by the digits 0, 1, 2, 3, 4 (without repetition). Find the probability that the number formed is divisible by 4.

(A) $\frac{5}{16}$
(B) $\frac{3}{18}$
(C) $\frac{6}{16}$
(D) None of the above

7. How many different words can be formed by permuting letters of the word STATISTICS?

(A) $\frac{10!}{2!3!3!}$
(B) $\frac{5!}{2!3!3!}$
(C) $\frac{2!3!3!}{10!}$
(D) $\frac{2!3!3!}{5!}$

8. Given the two line of regression as, $3X - 4Y + 8 = 0$ and $4X - 3Y = 1$, the means of X and Y are

(A) $\overline{X} = 4,\ \overline{Y} = 5$
(B) $\overline{X} = 4/3,\ \overline{Y} = 5/4$
(C) $\overline{X} = 3,\ \overline{Y} = 4$
(D) None of the above

9. Variance inflation factor is used to study

(A) normality
(B) linearity
(C) additivity
(D) multicollinearity

10. In a 5 × 5 Latin Square Design the degrees of freedom for error is

(A) 24
(B) 16
(C) 12
(D) 8

11. If the inner product of the columns of the design matrix X equal to 0 then such experimental designs are said to be

(A) incomplete block designs
(B) non – orthogonal designs
(C) orthogonal designs
(D) linear designs

12. In a Randomized Block Design with 4 blocks and 5 treatments having one missing observation the error degree of freedom will be

(A) 12
(B) 11
(C) 10
(D) 9

13. The value of $\lim_{n\to\infty} n\left(\frac{1}{(n+1)^2}+\frac{1}{(n+2)^2}+\frac{1}{(n+3)^2}+\cdots+\frac{1}{(2n)^2}\right)$ is

(A) $\frac{1}{2}$
(B) $\frac{1}{4}$
(C) 1
(D) ∞

14. Let $f(x) = 0$ for all $x \neq 0$ and let $f(0) = 2$. Then, zero (0) is

(A) an essential discontinuity
(B) a removable discontinuity
(C) a jump discontinuity
(D) an end point discontinuity

15. Choose the CORRECT statement among the following

(A) $\sum_{k=0}^{\infty} \frac{x^k}{k\ !}$ converges uniformly on $[-a, a]$, for every $a \in \Re$

(B) $\sum_{k=0}^{\infty} \frac{x^k}{k\ !}$ converges uniformly on all of the real line

(C) $\sum_{k=0}^{\infty} \frac{x^k}{k\ !}$ does not converge

(D) $\sum_{k=0}^{\infty} \frac{x^k}{k\ !}$ converges, but not uniformly

16. Let $f : \Re \to \Re$ be a continuous as well as periodic function. Then, it attains its

(A) supremum
(B) infimum
(C) supremum and infimum
(D) maximum and minimum

17. Which of the following statements is correct?

(A) If $\{f_n\}$ is a sequence of non-measurable functions and is fundamental in measure, then some subsequence $\{f_{nk}\}$ is almost uniformly fundamental

(B) If $\{f_n\}$ is a sequence of non-measurable functions and is fundamental in measure, then some subsequence $\{f_{nk}\}$ is fundamental in measure

(C) If $\{f_n\}$ is a sequence of measurable functions and is fundamental in measure, then some subsequence $\{f_{nk}\}$ is almost uniformly fundamental

(D) If $\{f_n\}$ is a sequence of measurable functions and is fundamental in measure, then some subsequence $\{f_{nk}\}$ is uniformly fundamental

18. If the rank of a square matrix A is less than its order, then

(A) $|A| = |A|^T$

(B) A^{-1} exist

(C) $|A| > 0$

(D) A^{-1} does not exist

19. Which of the following is said to be orthogonal?

(A) $\begin{pmatrix} 0 & 2 & 3 \\ -2 & 0 & 5 \\ -3 & -5 & 0 \end{pmatrix}$

(B) $\begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}$

(C) $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$

(D) $\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$

20. Find the trace of the matrix $\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$

(A) 45
(B) 15
(C) 11
(D) 19

21. If A is a real $m \times n$ matrix, then $A'A$ is a

(A) $m \times n$ matrix
(B) $n \times n$ symmetric matrix
(C) $m \times n$ symmetric matrix
(D) $n \times n$ skew symmetric matrix

22. A square matrix B is said to be idempotent if

(A) $B'B = I$
(B) $B^2 = B$
(C) $BB^{-1} = I$
(D) $B = B'$

23. The odds in favor of A winning a game of chess against B are 3 : 2. If 3 games are to be played, then the odds against A losing the first 2 games to B is

(A) 44 : 81
(B) 81 : 44
(C) 4 : 21
(D) 21 : 4

24. A box contains two fair coins and a biased coin with probability for heads given as 0.2. A coin is chosen at random from the box and tossed three times. If two heads and a tail are obtained, then the probability of the event that the chosen coin is fair is

(A) 1.0
(B) 0.11
(C) 0.78
(D) 0.89

25. A random variable is a continuous random variable, if

(A) its cumulative distribution function is a continuous function for all $x \in \Re$
(B) its density function is a continuous function for all $x \in \Re$
(C) its cumulative distribution function is a continuous function for some $x \in \Re$
(D) its density function is a continuous function for some $x \in \Re$

26. Choose the mode of the distribution whose density function is given by

$$f(x) = \begin{cases} 12x^2(1-x), & 0 < x < 1 \\ 0, & \text{else where} \end{cases}$$

(A) $\frac{1}{2}$
(B) $\frac{1}{4}$
(C) $\frac{2}{3}$
(D) $\frac{3}{4}$

27. A random variable X is said to be strictly larger than the random variable Y if ……………… for all real z

(A) $P(X > z) \geq P(Y > z)$
(B) $P(X > z) \leq P(Y > z)$
(C) $P(X > z) \geq P(Y < z)$
(D) $P(X < z) \leq P(Y > z)$

28. If X is a Uniform$\left(-\pi/2, \pi/2\right)$ random variable, the distribution of $Y = \tan X$ is

(A) Pareto
(B) Cauchy
(C) Laplace
(D) Weibull

29. Let X be a random variable such that its mean is 3 and variance is 4. The lower bound for the probability $P(-2 < X < 8)$ is

(A) 0.84
(B) 0.16
(C) 0.04
(D) 0.96

30. Find the mean if the pairs of values and their frequencies $x, f(x)$, are (1, 1), (2, 2), (3, 3), (4,4), (5,5), (6, 6), (7, 7), (8, 8), (9,9), and (10,10).

(A) 7
(B) 21
(C) 55
(D) 385

31. What is the value of skewness if the distribution is having mean, median and standard deviation 100, 90, and 10 respectively?

(A) –3
(B) 0
(C) 1
(D) 3

32. A student travelled 100 km distance to college in his car at a speed of 20 km per hour and return back to home at a speed of 30 km per hour. What is the average speed of the entire journey?

(A) 25 km per hour
(B) 24 km per hour
(C) 24.49 km per hour
(D) 36 km per hour

33. What is the value of coefficient of quartile deviation when first, second and third quartiles are 25, 50, and 75 respectively?

(A) 0.5
(B) 1
(C) 0.9
(D) 0.2

34. If $X_1, X_2, \cdots, X_n$ are independent random variables, then the distribution function of $Y_1 = \min(X_1, X_2, \cdots, X_n)$ is

(A) $F_{Y_1}(y) = 1 - \prod_{i=1}^{n}\left[1 - F_{X_i}(y)\right]$

(B) $F_{Y_1}(y) = \prod_{i=1}^{n}\left[1 - F_{X_i}(y)\right]$

(C) $F_{Y_1}(y) = 1 - \prod_{i=1}^{n} F_{X_i}(y)$

(D) $F_{Y_1}(y) = \prod_{i=1}^{n} F_{X_i}(y)$

35. Cauchy random variable X has the density function given by $f(x) = \dfrac{a}{a^2 + x^2}$, $-\infty < x < \infty$, $a > 0$. This density function is

(A) symmetrical about $x = 0$ so that its median is 0
(B) symmetrical about $x = a$ so that its median is a
(C) asymmetrical with median a
(D) positively skewed

36. Find the correlation coefficient if the two regression coefficients are 0.4 and 0.9 respectively.

(A) 0.36
(B) 0.55
(C) 0.60
(D) 0.65

37. A measure of statistical dispersion intended to represent the income inequality is

(A) Co-efficient of skewness
(B) Correlation coefficient
(C) Regression coefficient
(D) Gini's coefficient

38. Failure to measure some of the units in the selected sample leads to

(A) Standard error
(B) Sampling error
(C) Non-sampling error
(D) Experimental error

39. What is the probability of a specified sample of 3 units selected from 10 units?

(A) $\frac{3}{10}$
(B) $\frac{1}{120}$
(C) $10C_3$
(D) $\frac{3}{30}$

40. Which of the following statements is mostly considered in Neyman allocation of sample size in different strata?

(A) Stratum size and stratum variation
(B) The cost in taking observations per sampling unit in the stratum
(C) Sampling fraction
(D) Total number of units in the population

41. The relative precision of systematic sampling with simple random sampling is given by

(A) $\frac{(N-1)}{(N-n)}[1+\rho(n-1)]$

(B) $\frac{(1-f)}{(n)}[1+\rho(n-1)]$

(C) $\frac{(N-1)}{(N-n)}[1-\rho(n-1)]$

(D) $\frac{(1-f)}{(n)}[1-\rho(n-1)]$

42. A study provides the population size, variance and cost per unit of two strata are (400, 10, 4) and (600, 20, 9) respectively. Find the required sample size under optimum allocation by considering the fixed variance which is equal to 1.

(A) 40, 30
(B) 100, 67
(C) 67,100
(D) 88,176

43. What will be the mean sum of squares due to error if the design having 4 treatments each replicates 5 times, total sum of squares is 256, and treatment sum of square is 144?

(A) 7
(B) 48
(C) 112
(D) 55

44. What is the formula to calculate a missing value in a $n \times n$ latin square design if R, C, and T be the total of known observations in the i^{th} row, j^{th} column, k^{th} treatment respectively and S is the total of known observations?

(A) $\frac{n(R+C+T)-2S}{(n-1)(n-2)}$

(B) $\frac{n(R+C+T)}{(n-1)(n-2)}$

(C) $\frac{n(R+C+T)-S}{(n-1)(n-2)}$

(D) $\frac{n(R+C+T)-2S}{n^2-1}$

45. What will be the error degrees of freedom in a 2^3 factorial experiment having b randomized blocks?

(A) $7(b-1)$
(B) $7b-1$
(C) $8b-1$
(D) $b-1$

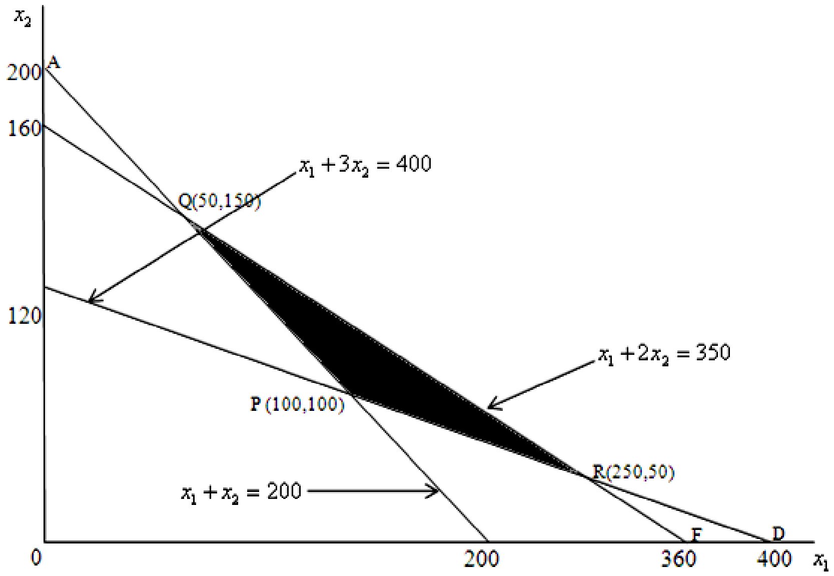
46. Find the missing value in a randomized block design if 40 and 90 are the treatment and block total of known observations in the missing row and column respectively, 200 is the sum of known observations in the design having 5 treatments and 4 blocks.

(A) 38
(B) 18
(C) 18.9
(D) 30

47. The contrast for estimating the ABC effect in 2^3 factorial experiments is

(A) (abc) – (bc) + (ac) – (c) + (ab) + (b) – (a) – (1)
(B) (abc) + (bc) + (ac) – (c) – (ab) – (b) – (a) + (1)
(C) (abc) + (bc) – (ac) + (c) – (ab) – (b) + (a) – (1)
(D) (abc) – (bc) – (ac) + (c) – (ab) + (b) + (a) – (1)

48. With the following diagram, find the optimum coordinates of the given linear programming problem, Min $Z = 200x_1 + 400x_2$,



(A) (50,100)
(B) (0, 0)
(C) (100,100)
(D) (250, 50)

49. Find the optimum assignment from the given optimum table in an assignment problem.

	T1	T2	T3	T4	T5
D1	15	0	20	15	0
D2	15	15	0	10	0
D3	15	0	20	15	5
D4	0	15	20	0	5
D5	5	0	10	0	0

(A) D1 → T5 ; D2 → T3 ; D3 → T2 ; D4 → T4 ; D5 → T1
(B) D1 → T1 ; D2 → T2 ; D3 → T3 ; D4 → T4 ; D5 → T5
(C) D1 → T2 ; D2 → T5 ; D3 → T3 ; D4 → T1 ; D5 → T4
(D) D1 → T5 ; D2 → T3 ; D3 → T2 ; D4 → T1 ; D5 → T4

50. How many ways of the tour plan if a salesman has to visit 6 cities?

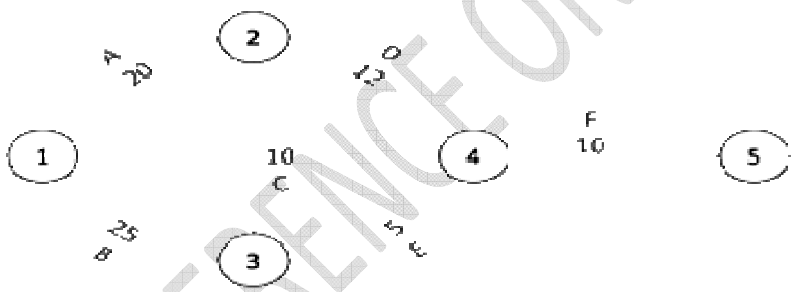
(A) 720
(B) 120
(C) 5040
(D) 6

51. What will be the value of the game with the following payoff matrix?

$$\begin{array}{cc} & \textit{Player}\ \mathrm{B} \\ \textit{Player}\ \mathrm{A} & \begin{bmatrix} -1 & 2 & -2 \\ 6 & 4 & -6 \end{bmatrix} \end{array}$$

(A) –2
(B) –1
(C) –6
(D) 6

52. Find the critical path of the following network



(A) $1 \rightarrow 2 \rightarrow 3 \rightarrow 4 \rightarrow 5$
(B) $1 \rightarrow 2 \rightarrow 4 \rightarrow 5$
(C) $1 \rightarrow 3 \rightarrow 4 \rightarrow 5$
(D) $1 \rightarrow 4 \rightarrow 5$

53. Basic feasible solution of a LPP is defined as

(A) a solution which satisfies the non-negative restrictions
(B) a basic solution which satisfies the non-negative restrictions
(C) a basic solution which optimize the objective function
(D) a solution which satisfies the constraints and non-negative restrictions

54. The process capability index C_{pk} is defined by

(A) $C_{pk} = \min\left\{\frac{USL-\hat{\mu}}{3\hat{\sigma}}, \frac{\hat{\mu}-LSL}{3\hat{\sigma}}\right\}$

(B) $C_{pk} = \min\left\{\frac{USL-\hat{\mu}}{3\hat{\sigma}}, \frac{LSL-\hat{\mu}}{3\hat{\sigma}}\right\}$

(C) $C_{pk} = \min\left\{\frac{USL-\hat{\mu}}{6\hat{\sigma}}, \frac{LSL-\hat{\mu}}{6\hat{\sigma}}\right\}$

(D) $C_{pk} = \min\left\{\frac{USL-\hat{\mu}}{6\hat{\sigma}}, \frac{\hat{\mu}-LSL}{6\hat{\sigma}}\right\}$

55. Which of the following are the performance measures of sampling plans?

(A) Operating characteristic function and average outgoing quality
(B) Acceptable quality level and limiting quality level
(C) Producer's quality level and consumer's quality level
(D) Point of control, acceptable quality level and limiting quality level

56. Under the assumption of normal distribution, the usual three-sigma limits imply that the type I error probability is

(A) $\alpha = 0.001$
(B) $\alpha = 0.0027$
(C) $\alpha = 0.0456$
(D) $\alpha = 0.0$

57. The minimum variance bound for unbiased estimator of variance (σ^2) of a random sample of n independent normal variate is

(A) $\frac{\sigma^2}{n}$

(B) $\frac{n}{\sigma^2}$

(C) $\frac{2\sigma^4}{n}$

(D) $\frac{n}{\left(2\sigma^4\right)}$

58. The Fisher information measure of n independent random observations from the exponential distribution with mean $\frac{1}{\theta}$, is

(A) $\frac{-n}{\theta}$

(B) $\frac{n}{\theta^2}$

(C) $\frac{1}{\theta^2}$

(D) $\frac{-1}{\theta^2}$

59. If X_i follows bin(n, θ) and $t = \Sigma x_i$, (i = 1, 2…, k), then the UMVUE of θ^2 is

(A) $\frac{t^2-1}{nk-1}$

(B) $\frac{t^2-t}{nk-1}$

(C) $\frac{t^2-1}{nk(nk-1)}$

(D) $\frac{t(t-1)}{nk(nk-1)}$

60. Which of the following is **NOT** true?

(A) A complete sufficient statistic is minimal sufficient statistic
(B) A statistic is said to be ancillary if its distribution depends on the θ
(C) If S is complete sufficient statistic for θ, then any ancillary statistic A is independent of θ
(D) A minimal sufficient statistic may not be complete sufficient statistic

61. Let $\overline{X}$ be the mean of a random sample of size n from normal distribution with mean μ and variance 25. What is the approximate value of n such that $P(\overline{X} - 1 < \mu < \overline{X} + 1) = 0.95$?

(A) 10
(B) 49
(C) 2401
(D) 96

62. Which of the following is **NOT** true?

(A) Consistent estimator is unique
(B) An unbiased estimator need not to be consistent
(C) Unbiased estimator may not be unique
(D) T_1 and T_2 are functionally related if T_1 and T_2 are sufficient statistics

63. Let X_i (i = 1, 2, …, k) be iid variates from $N(\mu,\sigma^2)$ and μ is known. What distribution of pivot for constructing the confidence interval for the parameter σ^2 is used?

(A) t - distribution
(B) F - distribution
(C) normal distribution
(D) chi-square distribution

64. A test φ is unbiased for testing $H_0:\theta\in\Theta_0$ vs $H_1:\theta\in\Theta_1$ if and only if its power function $\beta_\varphi(\theta)$ satisfies

(A) $\beta_\varphi(\theta) \geq \alpha$, for $\theta \in \Theta_0$
(B) $\beta_\varphi(\theta) \geq \alpha$, for $\theta \in \Theta_1$
(C) $\beta_\varphi(\theta) \leq \alpha$, for $\theta \in \Theta_1$
(D) $\beta_\varphi(\theta) = \alpha$, for $\theta \in \Theta_0$

65. If the powers of the most powerful tests at level α and α' be β and β', for testing a simple hypothesis H_0 against a simple alternative H_1, then always

(A) $\beta > \beta'$
(B) $\beta < \beta'$
(C) $\beta \neq \beta'$
(D) $\beta = \beta'$

66. The observed values are $x_1 = -1$ and $x_2 = 3$, in a test function

$$\varphi(x)=\begin{cases}1, \text{ if } x_1+x_2>1\\ 1/4, \text{ if } x_1+x_2=1\\ 0, \text{ if } x_1+x_2<1\end{cases}$$

(A) reject H_0
(B) accept H_0
(C) neither reject nor accept H_0
(D) not sufficient information given

67. Find the size of the test for testing $H_0 : \theta = ¼$ against $H_1 : \theta > ¼$ by taking random sample of size 10 and rejecting H_0 iff $\Sigma\, x_i > 8$ (for all i = 1, 2…,10), when X is a Bernoulli random variable with parameter θ

(A) $\frac{31}{4^{10}}$

(B) $\frac{4^{10}}{31}$

(C) $\left(\frac{1}{4}\right)^{10}$

(D) $\frac{1}{4^{10}}$

68. Let the random sample of sizes 20 and 20 drawn from the two independent populations respectively, then the mean of Wald-Wolfowitz run test statistic (under normal approximation) is

(A) 11
(B) 20
(C) 19
(D) 21

69. The likelihood ratio test statistic for testing $H_0 : \theta = \theta_0$ against $H_1 : \theta \neq \theta_0$ based on a sample of size 1 from the density $f(x, \theta) = \frac{2(\theta - x)}{\theta^2}$, $0 < x < \theta$ is

(A) $\frac{2x\left(\theta_0 - x\right)}{\theta_0^2}$

(B) $\frac{2\left(\theta_0 - x\right)}{\theta_0^2}$

(C) $\frac{4x\left(\theta_0 - x\right)}{\theta_0^2}$

(D) $\frac{4x\left(\theta - x\right)}{\theta^2}$

70. If X and Y are the random variables having the joint density function given by $f(x, y) = x + y,\ 0 < x < 1,\ 0 < y < 1,$ then the covariance of X and Y is equal to

(A) $\frac{1}{11}$

(B) $\frac{1}{12}$

(C) $\frac{1}{144}$

(D) $\frac{1}{72}$

71. The random variables X and Y whose joint probability density function given by $f(x, y) = e^{-y}, 0 < x < y < \infty$ are

(A) independent
(B) pairwise independent
(C) dependent
(D) mutually independent

72. If $\{A_n\}$ is a non-decreasing sequence of events, then

(A) $P\left(\lim_{n\to\infty} A_n\right) = P\left(\bigcup_{i=1}^{\infty} A_i\right)$

(B) $P\left(\lim_{n\to\infty} A_n\right) \leq P\left(\bigcup_{i=1}^{\infty} A_i\right)$

(C) $P\left(\lim_{n\to\infty} A_n\right) = P\left(\bigcap_{n=1}^{\infty} A_i\right)$

(D) $P\left(\lim_{n\to\infty} A_n\right) \geq P\left(\bigcap_{n=1}^{\infty} A_i\right)$

73. If $X_1, X_2, \ldots, X_n$ are mutually independent random variables, each having finite mean μ and standard deviation σ, and if $S_n = \frac{1}{n}\sum_{i=1}^{n} X_i$, then the law of large numbers states that

(A) $\lim_{n \to \infty} P\left(\left|\frac{S_n}{n} - \mu\right| < \varepsilon\right) = 0$

(B) $\lim_{n \to \infty} P\left(\left|\frac{S_n}{n} - \mu\right| \geq \varepsilon\right) = 0$

(C) $\lim_{n \to \infty} P\left(\left|\frac{S_n}{n} - \mu\right| \geq \varepsilon\right) = 1$

(D) $\lim_{n \to \infty} P\left(\left|\frac{S_n}{n} - \mu\right| < \varepsilon\right) > 1$

74. Test of homogeneity of variances of several normal populations is done by

(A) Sequential Probability Ratio Test
(B) Bartlett test
(C) Sign test
(D) Kruskal-Wallis test

75. If the Laspeyre's and Paasche's price index are 144 and 121 respectively, then the Fisher's price index is

(A) 132.5
(B) 132
(C) 265
(D) 204.5

76. Which organization provides data for national income?

(A) Central Statistical Organization
(B) Indian Census Organization
(C) National Sample Survey Organization
(D) National Population Commission

77. A census method in which persons are counted wherever they are at the date of census is known as

(A) De facto method
(B) De jure method
(C) Slip system
(D) Pure census

78. $\int_0^{\frac{\pi}{2}} \sin^5 x \cos x \, dx =$

(A) $\frac{1}{3}$
(B) $\frac{1}{6}$
(C) $\frac{2}{3}$
(D) $\frac{3}{2}$

79. $\int_{0}^{\frac{\pi}{2}} \sqrt{\sin x + 1} \cos x \, dx =$

(A) $2\sqrt{2}$

(B) $2\sqrt{2} - 1$

(C) $\frac{2}{3}\left(2\sqrt{2} - 1\right)$

(D) $\sqrt{2}$

80. The value of $\int_{0}^{1} x(1-x)^4 \, dx$ is

(A) $\frac{1}{12}$

(B) $\frac{1}{30}$

(C) $\frac{1}{24}$

(D) $\frac{1}{20}$

81. If $w = x + 2y + z^2$ and $x = \cos t$, $y = \sin t$, $z = t$, then $\frac{dw}{dt}$ is

(A) $\sin t + \cos t + 2t$

(B) $-\sin t - \cos t + 2t$

(C) $-\sin t + 2\cos t + 2t$

(D) $\sin t + 2\cos t + 2t$

82. Let $y=\sqrt{u},\ u=v^3+1,\ v=\sin x,$ then $\frac{dy}{dx}=$

(A) $\frac{3}{2}\sin x\cos x$

(B) $\frac{3}{2}\frac{\sin^2 x\cos x}{\sqrt{\sin^3 x+1}}$

(C) $\frac{3}{2}\frac{\sin x\cos x}{\sqrt{\sin^4 x+1}}$

(D) $\frac{3}{2}\frac{\cos x}{\sqrt{\sin^3 x+1}}$

83. The series of positive terms $\sum_{n=0}^{\infty} a_n = \sum_{n=0}^{\infty} \frac{n!}{n^n}$ is

(A) Convergent
(B) Divergent
(C) Equal to 1
(D) Equal to 0

84. If a function $f(x)$ is twice differentiable and has a minimum value, then

(A) $f''(x)<0$

(B) $f''(x)>0$

(C) $f''(x)=0$

(D) $f''(x)$ is a constant

85. The matrix $A=\begin{bmatrix}\cos\theta & \sin\theta \\ -\sin\theta & \cos\theta\end{bmatrix}$ is

(A) Singular
(B) Orthogonal
(C) Skew Symmetric
(D) Negative semi definite

86. If $A-2B=\begin{bmatrix}1 & -2\\ 3 & 0\end{bmatrix}$ and $2A-3B=\begin{bmatrix}-3 & 3\\ 1 & -1\end{bmatrix}$ then B is equal to

(A) $\begin{bmatrix}-5 & 7\\ -5 & 1\end{bmatrix}$

(B) $\begin{bmatrix}-5 & 7\\ 0 & 1\end{bmatrix}$

(C) $\begin{bmatrix}-5 & 7\\ -5 & -1\end{bmatrix}$

(D) $\begin{bmatrix}5 & -7\\ -5 & 1\end{bmatrix}$

87. If A and B are two possible outcomes of an experiment and if $P(A)=0.4,\ P(A^C \cap B^C)=0.3$ then for what value of $P(B), A$ and B are mutually exclusive?

(A) 0.5
(B) 0.4
(C) 0.3
(D) 0.2

88. Let P be the probability function that assigns the same weight to each of the points of the sample space, $\Omega=\{1,2,3,4\}$. Consider the events $E=\{1,2\}$, $F=\{1,3\}$ and $G=\{3,4\}$. Then which of the following statement(s) is/are true?

(i) E and F are independent
(ii) E and G are independent
(iii) F and G are independent
(iv) E, F and G are independent

(A) (i) and (ii) only
(B) (i) and (iii) only
(C) (ii) and (iii) only
(D) All (i), (ii) and (iii)

89. The probabilities that an item has defects I, II and III are respectively 0.3, 0.2 and 0.1. The probability that an item would not contain any one of these defects, is not less than

(A) 0.121
(B) 0.901
(C) 0.400
(D) 0.504

90. From integers 1 to 40, both inclusive, one integer is chosen at random. What is the probability that it is divisible by 4 or 5?

(A) $\frac{2}{5}$
(B) $\frac{1}{20}$
(C) $\frac{9}{20}$
(D) $\frac{5}{108}$

91. An urn contains $'a'$ white and $'b'$ black balls. All the balls are drawn from it in succession. What is the probability that the second drawn ball is white?

(A) $\frac{a}{(a+b-1)}$
(B) $\frac{(a-1)}{(a+b-1)}$
(C) $\frac{a}{(a+b)}$
(D) $\frac{(a+b-1)}{(a+b)}$

92. Let A and B be two independent events with $P(A)+P(B)=1, P(A\cap B)=\frac{2}{9}$ and $P(B)<P(A)$. Then $P(A)$ equals

(A) $\frac{1}{3}$

(B) $\frac{1}{2}$

(C) $\frac{2}{3}$

(D) $\frac{3}{4}$

93. Let X_1 and X_2 be independent standard normal variates. Let U_1 and U_2 be independent and identically distributed $U(0,1)$ variates, independent of X_1 and X_2. Define $Z=\frac{X_1U_1+X_2U_2}{\sqrt{U_1^2+U_2^2}}$. Then which of the following is/are CORRECT?

(i) $E(Z)=0$

(ii) $V(Z)=1$

(iii) Z is Cauchy

(iv) $Z \sim N(0,1)$

(A) (i) and (ii) only
(B) (iii) only
(C) (i), (ii) and (iv) only
(D) (i), (ii) and (iii) only

94. The probability density function (pdf) of X is $f(x)=\frac{x}{6}+k;\ 0<x<3$. Then, the value of k is

(A) $\frac{1}{3}$

(B) $\frac{1}{6}$

(C) $\frac{1}{12}$

(D) $\frac{1}{2}$

95. The pdf of X is $f(x)=\frac{1}{2}e^{-|x|}, \ -\infty < x < \infty$. The value of $P(X > -2)$ is

(A) $\frac{1}{2\left(1-e^{-2}\right)}$

(B) e^{-2}

(C) $1-\frac{1}{2}e^{-2}$

(D) $\frac{e^{-2}}{2}$

96. If the pdf of a random variable X is $f(x)=\theta e^{-\theta x}, \ x>0$, then the pdf of $Y=e^{-\theta X}$ is

(A) $f(y)=\theta y, \ \theta < y < 1$

(B) $f(y)=\theta y^{\theta-1}, \ \theta < y < 1$

(C) $f(y)=1, \ 0 < y < 1$

(D) $f(y)=\theta \log y, \ 0 < y < 1$

97. For a hypergeometric distribution having its probability mass function $P_x=\frac{\binom{M}{x}\binom{N-M}{n-x}}{\binom{N}{n}}$, the actual lower and upper limits of x are respectively

(A) 0 and ∞
(B) 0 and M
(C) n and M
(D) 0 and min(M, n)

98. A Poisson distribution with mean $\lambda > 0$ is

(A) positively skewed and platykurtic
(B) positively skewed and leptokurtic
(C) negatively skewed and platykurtic
(D) negatively skewed and leptokurtic

99. If X is uniformly distributed with mean 1 and variance $\frac{4}{3}$, then the range of X is given by

(A) (0, 2)
(B) (−1, 3)
(C) (−3, 5)
(D) (−2, 1)

100. Let X be a discrete random variable with moment generating function, $M_x(t) = \left(\frac{1}{4} + \frac{3}{4}e^t\right)^2 \left(\frac{3}{4} + \frac{1}{4}e^t\right)^3$. Then, which one of the following is CORRECT?

(A) $E(X) = \frac{9}{4}$

(B) $V(X) = \frac{15}{32}$

(C) $P(X \geq 1) = \frac{27}{1024}$

(D) $P(X = 5) = \frac{3}{1024}$

101. Let the random variable X have moment generating function, $M_x(t) = e^{2t(1+t)}$. Then $P(X \leq 2)$ is

(A) $\frac{1}{4}$

(B) $\frac{1}{2}$

(C) $\frac{1}{3}$

(D) $\frac{2}{3}$

102. The second moment about origin of beta distribution of the first kind having parameters 'a' and 'b' is

(A) $\dfrac{a(a-1)}{(a+b)(a+b-1)}$

(B) $\dfrac{a(a+1)}{(a+b)(a+b+1)}$

(C) $\dfrac{a(a+1)}{b(b+1)}$

(D) $\left(\dfrac{a+1}{a+b}\right)^2$

103. The pdf of a normal distribution is given by $f(x)=\dfrac{1}{3\sqrt{\pi}}e^{-\left(\frac{x+1}{3}\right)^2}$; $-\infty < x < \infty$. Find the values of its characteristics given in Group A by matching them with those given in Group B

	Group A		Group B
(a)	Mode	(i)	$\dfrac{243}{4}$
(b)	Variance	(ii)	-1
(c)	Fourth central moment	(iii)	$\dfrac{9}{2}$

(A) (a) – (i), (b) – (ii), (c) – (iii)
(B) (a) – (i), (b) – (iii), (c) – (ii)
(C) (a) – (iii), (b) – (i), (c) – (ii)
(D) (a) – (ii), (b) – (iii), (c) – (i)

104. If $X \sim N(0,1)$, the values of $E(\sin X)$ and $E(\cos X)$ are respectively

(A) 0 and 1
(B) 1 and 0
(C) 0 and $\dfrac{1}{\sqrt{e}}$
(D) $\dfrac{1}{\sqrt{e}}$ and 1

105. Let $X_i^{'}s(i=1,2,3)$ be independent $N(0,1)$ variates. If $\left(X_1+kX_3, X_2+kX_3\right)$ follows bivariate normal distribution with correlation coefficient 0.25, then the absolute value of k will be

(A) $\frac{1}{\sqrt{2}+1}$

(B) $\frac{1}{\sqrt{3}+1}$

(C) $\frac{1}{\sqrt{2}}$

(D) $\frac{1}{\sqrt{3}}$

106. If the random variables X, Y and Z have the variance, $\sigma_x^2=10$, $\sigma_y^2=14$ and $\sigma_z^2=20$; $\text{cov}(X,Y)=1$, $\text{cov}(X,Z)=-3$ and $\text{cov}(Y,Z)=2$, then what is the covariance between $U=X+4Y+2Z$ and $V=3X-Y-Z$.

(A) –76
(B) 82
(C) –82
(D) 76

107. Let X_1, X_2, X_3 and X_4 be four uncorrelated random variables each with variance σ^2 then the correlation coefficient between $U=X_1+X_2+X_3$ and $V=X_1+X_2+X_4$

(A) 1
(B) $\frac{1}{3}$
(C) $\frac{2}{3}$
(D) 0

108. If only two observations on (X, Y), (x_1, y_1) and (x_2, y_2) are available, then which of the following is an appropriate estimator of the $\text{cov}(X, Y)$?

(A) $(1/2)(x_1 - x_2)(y_1 - y_2)$

(B) $(1/4)(x_1 - x_2)(y_1 - y_2)$

(C) $(x_1 - x_2)(y_1 - y_2)$

(D) $(1/2)(x_1 - y_1)(x_2 - y_2)$

109. If σ_X^2, σ_Y^2 and σ_{X-Y}^2 are the variance of X, Y and $X - Y$ respectively, then the correlation coefficient between X and Y is

(A) $\dfrac{\sigma_X^2 + \sigma_Y^2 - 2\sigma_{X-Y}^2}{2\sigma_X \sigma_Y}$

(B) $\dfrac{\sigma_X^2 + \sigma_Y^2 - \sigma_{X-Y}^2}{2\sigma_X \sigma_Y}$

(C) $\dfrac{\sigma_X^2 + \sigma_Y^2}{2\sigma_X \sigma_Y}$

(D) $\dfrac{\sigma_X^2 - \sigma_Y^2}{2\sigma_X \sigma_Y}$

110. Let $X_1, X_2, ..., X_n$ be identically independently distributed random variables each having a uniform distribution on (0, 1). Consider the histogram of these values with k equally spaced intervals given by $\{(a_i, b_i], i = 1, 2, ..., k\}$ where $a_i = (i-1)/k$ and $b_i = a_i + (1/k)$. Let N_i be the number of values in the interval $(a_i, b_i]$. Then the covariance N_1 and N_k is

(A) 0

(B) $\dfrac{-n}{k^2}$

(C) $\dfrac{n}{k^2}$

(D) $\dfrac{1}{2}$

111. The minimum value of $V(Y-aX)$ for all the value of $'a'$ is given by

(A) $\rho^2 \frac{V(Y)}{V(X)}$

(B) $\rho^2 \frac{V(X)}{V(Y)}$

(C) $\rho^2 V(Y)$

(D) $\left(1-\rho^2\right)V(Y)$

112. For n pairs of observations, the maximum possible value of $\sum \sum_{i=1}^{n} d_i^2$ where d_i is the difference between the two ranks of i^{th} object, is

(A) $n\left(n^2-1\right)$

(B) $\frac{n\left(n^2-1\right)}{2}$

(C) $\frac{n\left(n^2-1\right)}{6}$

(D) $\frac{n\left(n^2-1\right)}{3}$

113. If $x=4y+5$ and $y=kx+4$ are the lines of regression of x on y and that of y on x respectively, then which one of the following is true?

(A) $k \geq 1$
(B) $k \leq -1$
(C) $-1 \leq k \leq 0$
(D) $0 \leq k \leq (1/4)$

114. The two regression lines associated with (X,Y) are $8x-10y+66=0$ and $40x-18y=214$. The correlation coefficient between X and Y is

(A) –0.6
(B) +0.6
(C) –0.36
(D) +0.36

115. If the joint pdf of (*X*, *Y*) is $f(x, y) = \frac{1}{3}x^2 e^{-y(1+x)}$, $x > 0, y > 0,$ then the regression equation of *Y* on *X* is

(A) $y = \frac{1}{(1+x)}$

(B) $y = \frac{x^2}{(1+x)}$

(C) $y = 1 + x$

(D) $y = \frac{x^2}{2(1+x)^2}$

116. The standard error of the sample correlation coefficient r_{xy} is equal to

(A) $\frac{1-r^2}{n-2}$

(B) $\sqrt{\frac{(1-r^2)}{(n-2)}}$

(C) $\frac{\sqrt{1-r^2}}{n-2}$

(D) $\frac{1-r^2}{\sqrt{n-2}}$

117. A simple random sample of *n* units is drawn from population containing *N* units with replacement. Let T_1 be the mean of all the units in the sample and T_2 the mean of distinct units in the sample. Which one of the following assertions about T_1 and T_2 is correct?

(A) T_2 is a biased estimator of the population mean

(B) Both T_1 and T_2 are unbiased estimators of the populations mean and $V(T_1) \geq V(T_2)$

(C) Both T_1 and T_2 are unbiased estimators of the populations mean and $V(T_1) = V(T_2)$

(D) Both T_1 and T_2 are unbiased estimators of the populations mean and $V(T_1) < V(T_2)$

118. In simple random sampling without replacement, the probability that two particular units are selected in the sample is

(A) $\dfrac{n(n-1)}{N(N-1)}$

(B) $\dfrac{n^2}{N^2}$

(C) $\dfrac{1}{N(N-1)}$

(D) $\dfrac{N(N-1)}{n+1}$

119. From a population of 200 units, a simple random sample without replacement has been obtained as (4, 3, 5, 8, 9, 7). An unbiased estimate of the population total is

(A) 3600
(B) 6
(C) 1200
(D) 1800

120. In a simple random sample of 4 from 16 districts in a state has standard deviation of 45. Then, the standard error of mean is

(A) 21.5
(B) 22.5
(C) 19.5
(D) 11.25

121. Suppose there are k strata of $N = kM$ units each with size M. Draw a sample of size n_i denote by $\overline{y}_i$, the sample mean of the study variable selected in the i^{th} stratum, $i = 1, 2, \ldots k$. Define $\overline{y}_s = \frac{1}{k}\sum_{i=1}^{k} \overline{y}_i$ and $\overline{y}_w = \frac{1}{n}\sum_{i=1}^{n} \frac{n_i y_i}{n}$. Which of the following is necessarily true?

(A) $\overline{y}_s$ is unbiased but $\overline{y}_w$ is not unbiased for the population mean
(B) $\overline{y}_s$ is not unbiased but $\overline{y}_w$ is unbiased for the population mean
(C) Both $\overline{y}_s$ and $\overline{y}_w$ are unbiased for the population mean
(D) Neither $\overline{y}_s$ nor $\overline{y}_w$ is unbiased for the population mean

122. In the following ANOVA table for Completely Randomized Design (CRD) find the Error Sum of Squares where b is some positive value.

Source	Df	SS	MSS
Treatment	4	--	3b
Error	--	--	b
Total	9	425	

(A) 125
(B) 25
(C) 106.25
(D) 47.22

123. Control chart for the number of defectives is

(A) c-chart
(B) p- chart
(C) np- chart
(D) R-chart

124. Which of the following is **NOT** true for R-chart?

(A) R and standard deviation fluctuate together in case of small samples
(B) R is easily calculable
(C) R- charts are economical
(D) R- chart can identify small shifts in the data

125. When there is no defective in the lot, the OC function for $p = 0$ is

(A) $L(0) = 0$
(B) $L(0) = 1$
(C) $L(0) = \infty$
(D) $L(0) = 0.5$

126. The producer's risk is probability of

(A) rejecting a good lot
(B) accepting a good lot
(C) rejecting a bad lot
(D) accepting a bad lot

127. Let $X_1, X_2, ..., X_n$ be random samples from Uniform (θ_1, θ_2) and let $X_{(1)}, X_{(2)}, ..., X_{(n)}$ denote their ordered values. Which of the following statement is correct?

(A) $X_{(1)}$ and $X_{(n)}$ are sufficient for θ_2 and θ_1 respectively

(B) $(X_{(1)}, X_{(n)})$ is jointly sufficient for (θ_1, θ_2)

(C) $X_{(1)}$ is sufficient for both θ_1 and θ_2

(D) $X_{(n)}$ is sufficient for both θ_1 and θ_2

128. Let $X_1, X_2, ..., X_n$ be a random sample from Poisson distribution with mean μ. Then the MLE of μ is

(A) $\sum X_i / n$

(B) $\sum (X_i - \mu)^2$

(C) $\sum X_i^2$

(D) Median of $X_1, ..., X_n$

129. If T_1 and T_2 be two unbiased estimators of a parameter θ, then the efficiency of T_1 with respect to T_2 is

(A) $V(T_1) + V(T_2)$

(B) $\dfrac{V(T_2)}{V(T_1)}$

(C) $V(T_1) - V(T_2)$

(D) $\dfrac{V(T_1)}{V(T_2)}$

130. Let $\bar{X}_1$ and $\bar{X}_2$ be sample means based on independent random samples drawn from normal distribution with means μ_1 and μ_2 respectively and common variance σ^2. If ${S_p}^2$ denote the pooled sample variance, then 100 $(1 - \alpha)$% for confidence for $(\mu_1 - \mu_2)$ is

(A) $\left(\bar{X}_1 - \bar{X}_2\right) \pm Z_{\alpha/2}\sqrt{S_P^2\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}$

(B) $\left(\bar{X}_1 - \bar{X}_2\right) \pm t_{\alpha/2}\sqrt{S_P^2\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}$

(C) $\left(\bar{X}_1 - \bar{X}_2\right) \pm F_{\alpha/2}\sqrt{S_P^2\left(\frac{1}{n_1}+\frac{1}{n_2}\right)}$

(D) $\left(\bar{X}_1 - \bar{X}_2\right) \pm Z_{\alpha/2}\sqrt{S_P^2\left(n_1+n_2\right)}$

131. Let $X_1, X_2, ..., X_n$ be a random sample from $N\left(\mu, \sigma^2\right), \sigma^2$ is known. To test $H_0 : \mu = \mu_0$ against $H_1 : \mu = \mu_1$, we use

(A) Z – test
(B) t – test
(C) F – test
(D) Chi square test

132. In the usual notation, the confidence interval for the population variance σ^2 is

(A) $\frac{(n-1)s^2}{\chi^2_{\alpha/2}} \leq \sigma^2 \leq \frac{(n-1)s^2}{\chi^2_{1-\alpha/2}}$

(B) $\frac{ns^2}{\chi^2_{\alpha/2}} \leq \sigma^2 \leq \frac{ns^2}{\chi^2_{1-\alpha/2}}$

(C) $\frac{(n-1)s^2}{\chi^2_{\alpha}} \leq \sigma^2 \leq \frac{(n-1)s^2}{\chi^2_{1-\alpha}}$

(D) $\frac{(n-1)s^2}{\chi^2_{\alpha/2}} \geq \sigma^2 \geq \frac{(n-1)s^2}{\chi^2_{1-\alpha/2}}$

133. If [62, 75] is the 95% confidence interval for the mean of a population based on 10 observations then to test H : Mean = m against K : Mean < m, the correct test procedure is

(A) Reject H if $m \in [62,75]$

(B) Reject H if m lies outside the interval [62,75]

(C) Reject H if $m < 62$

(D) Reject H if $m > 75$

134. Student t-test is used for testing the $H_0 : \rho = 0$ against $H_1 : \rho > 0$, ρ being the population correlation coefficient for which the test statistic $t = \frac{r}{\sqrt{1-r^2}}\sqrt{n-2}$ and r being the sample correlation coefficient. The hypothesis is rejected if

(A) r is positive and $t \geq t_{\alpha,n-2}$

(B) r is negative and $t \geq t_{\alpha,n-2}$

(C) r is positive and $t = t_{\alpha,n-1}$

(D) r is negative and $t = t_{\alpha,n}$

135. Let $X_1, X_2, ..., X_n$ be a random sample from $N(\mu, \sigma^2)$, σ^2 is unknown. To test $H_0 : \mu = \mu_0$ Vs. $\mu = \mu_1$, we use

(A) Z – test
(B) t – test
(C) F – test
(D) χ^2 – test

136. Every UMP critical region is necessarily

(A) biased
(B) a null set
(C) an infinite set
(D) unbiased

137. Suppose $\left(X_1, X_2\right)$ ~Bivariate Normal distribution with $E(X_1) = E(X_2) = 0$;

$V(X_1) = V(X_2) = 2$ and $\operatorname{cov}\left(X_1, X_2\right) = -1$. If $\phi(x) = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{x} e^{-\frac{y^2}{2}} dy$, then

$P\left[X_1 - X_2 > 6\right]$ is equal to

(A) $\phi(-1)$
(B) $\phi(-3)$
(C) $\phi(\sqrt{6})$
(D) $\phi(-\sqrt{6})$

138. Let (X, Y) have bivariate normal distribution. Which of the statements are correct?

(i) X and Y are independent if and only if the correlation coefficient between them is zero
(ii) Every linear combination of X and Y is a normal variate
(iii) The regression equation of Y on X and regression equation X on Y are linear and homoscedastic

(A) (i) and (iii) only
(B) (ii) and (iii) only
(C) (i) and (ii) only
(D) All (i), (ii) and (iii) are correct

139. X and Y are two independent random variables with some of the joint probabilities given as

		X = 1	X = 2	X = 3	Total
Y	0	.08	--	--	--
	1	--	--	--	0.2
Total		--	0.2	--	

Then, $P(X = 3, Y = 1)$ is

(A) 0.10
(B) 0.12
(C) 0.14
(D) 0.16

140. The joint distribution function of X and Y is $F(x,y)=\frac{xy^3}{2}$, $0<x<2; 0<y<1$. The marginal pdf of Y is

(A) $f_Y(y)=4y^3, 0<y<1$

(B) $f_Y(y)=3y^2, 0<y<1$

(C) $f_Y(y)=2y, 0<y<1$

(D) $f_Y(y)=y^3/2, 0<y<1$

141. If X is a random variable with μ and variance σ^2 and k is any positive number, then which one of the following is not the Chebyshev's inequality?

(A) $P\{|X-\mu|\geq k\sigma\}\leq 1/k^2$

(B) $P\{|X-\mu|<k\sigma\}\leq 1-\left(1/k^2\right)$

(C) $P\{|X-\mu|>k\}\leq \sigma^2/k^2$

(D) $P\{|X-\mu|<k\}\geq \sigma^2/k^2$

142. Let $X_1, X_2, ...X_n$ be identically independently distributed Exp(1) variate and $S_n=\sum_{i=1}^{n} X_i$. Using the central limit theorem, the value of $\lim_{n\to\infty} P(S_n>n)$ is

(A) 0

(B) $\frac{1}{3}$

(C) $\frac{1}{2}$

(D) 1

143. Let $X_1, X_2, ...X_n$ be a random sample from the uniform distribution on (0, 2) and $M_n=\max(X_1, X_2, ...X_n)$. Then which one of the following statement is not true?

(A) $M_n\to 2$ almost surely

(B) $M_n\to 2$ in probability

(C) $M_n\to 2$ in distribution

(D) $(M_n-2)/\sqrt{n}$ converges in distribution to a normal random variable

144. Let $X_1, X_2, \ldots X_n$ be *iid* variates with mean μ and variance σ^2 and as $n \to \infty$ $\left(X_1^2 + X_2^2 + \ldots + X_n^2\right) / n \xrightarrow{P} C$ for $0 \le C < \infty$. The value of C is

(A) $\sigma^2 + \mu^2$
(B) σ^2
(C) μ^2
(D) 1

145. Let $\{X_n\}$, $n \ge 1$ be a sequence of identically independently distributed random variables having mean = n and variance = $2n$. Let Z be a standard normal variate. Then using the central limit theorem, $\lim\limits_{n\to\infty}\left[P\left(X_n > \frac{3}{4}n\right) + P\left(X_n > n + 2\sqrt{2n}\right)\right]$ equals

(A) $1 + P[Z \le 2]$
(B) $1 - P[Z \le 2]$
(C) $P[Z \le 2]$
(D) $2 - P[Z \le 2]$

146. ***A*** appeared in three tests of the value 20, 50 and 30 marks respectively. He obtained 75% and 60% marks in the first two test respectively. If the aggregate marks is 60%, his percentage of marks in the third test is

(A) 55%
(B) 50%
(C) 65%
(D) 45%

147. The average of n numbers is z. if the number x is replaced by the number x' the average becomes z'. The relation among n, z, z', x, x' is

(A) $\frac{z'-z}{x'-x} = \frac{1}{n}$

(B) $\frac{z-z'}{x'-x} = \frac{1}{n}$

(C) $\frac{x'-x}{z'-z} = \frac{1}{n}$

(D) $\frac{x-x'}{z'} = \frac{1}{n}$

148. If $\sum_{i=1}^{n}\left(\frac{1}{2}\log x_i - \log 2\right) = 0$, then the geometric mean of n observations, $x_1, x_2, \ldots, x_n$ is

(A) 2
(B) log 2
(C) $\sqrt{2}$
(D) 4

149. The sum and the sum of squares of 20 observations were found as 790 and 36500 respectively. Later on, it was detected that one observation had wrongly been taken as 35 instead of 45. The correct value of the variance is

(A) 220
(B) 245
(C) 248
(D) 265

150. Let $\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^4 = 100$ and $\sum_{i=1}^{n}\left(X_i - \overline{X}\right)^2 = 30$. Which of the following may be a possible value of n?

(A) 10
(B) 9
(C) 8
(D) 7

FINAL ANSWER KEY

Subject Name: STATISTICS

SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key	SI No.	Key
1	A	31	D	61	D	91	C	121	A
2	B	32	B	62	A	92	C	122	A
3	B	33	A	63	D	93	C	123	C
4	B	34	A	64	B	94	C	124	D
5	A	35	A	65	D	95	C	125	B
6	A	36	C	66	A	96	C	126	A
7	A	37	D	67	A	97	D	127	B
8	A	38	C	68	D	98	B	128	A
9	D	39	B	69	C	99	B	129	B
10	C	40	A	70	C	100	A	130	B
11	C	41	A	71	C	101	B	131	A
12	B	42	D	72	A	102	B	132	A
13	A	43	A	73	B	103	D	133	C
14	B	44	A	74	B	104	C	134	A
15	A	45	A	75	B	105	D	135	B
16	C	46	D	76	A	106	C	136	D
17	C	47	D	77	B	107	C	137	D
18	D	48	C	78	B	108	B	138	D
19	B	49	D	79	C	109	B	139	C
20	B	50	B	80	B	110	B	140	B
21	B	51	A	81	C	111	D	141	D
22	B	52	A	82	B	112	D	142	C
23	D	53	B	83	A	113	D	143	D
24	D	54	A	84	B	114	B	144	A
25	A	55	A	85	B	115	A	145	D
26	C	56	B	86	C	116	B	146	B
27	A	57	C	87	C	117	D	147	A
28	B	58	B	88	B	118	A	148	D
29	A	59	D	89	C	119	C	149	D
30	A	60	B	90	A	120	B	150	A