12 - Std

ACHIEVEMENT TEST - 2023-24

EXAM No. 2103

Time : 1.30 Hrs

MATHS

1) If A is a 3 x 3 non-singular matrix such that $AA^T = A^TA$ and $B = A^{-1}A^T$, then $BB^T =$
(a) A (b) B (c) I_3 (d) B^T

2) If $P = \begin{bmatrix} 1 & x & 0 \\ 1 & 3 & 0 \\ 2 & 4 & -2 \end{bmatrix}$ is the adjoint of 3 x 3 matrix A and |A| = 4, then x is
(a) 15 (b) 12 (c) 14 (d) 11

3) If $A = \begin{bmatrix} 3 & 1 & -1 \\ 2 & -2 & 0 \\ 1 & 2 & -1 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \\ a_{31} & a_{32} & a_{33} \end{bmatrix}$ then the value of a_{23} is
(a) 0 (b) -2 (c) -3 (d) -1

4) If $(AB)^{-1} = \begin{bmatrix} 12 & -17 \\ -19 & 27 \end{bmatrix}$ and $A^{-1} = \begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$, then B^{-1}
(a) $\begin{bmatrix} 2 & -5 \\ -3 & 8 \end{bmatrix}$ (b) $\begin{bmatrix} 8 & 5 \\ 3 & 2 \end{bmatrix}$ (c) $\begin{bmatrix} 3 & 1 \\ 2 & 1 \end{bmatrix}$ (d) $\begin{bmatrix} 8 & -5 \\ -3 & 2 \end{bmatrix}$

5) If, $x^a y^b = e^m$, $x^c y^d = e^n$, $\Delta_1 = \begin{vmatrix} m & b \\ n & d \end{vmatrix}$, $\Delta_2 = \begin{vmatrix} a & m \\ c & n \end{vmatrix}$, $\Delta_3 = \begin{vmatrix} a & b \\ c & d \end{vmatrix}$ then the values of x and y are respectively,
(a) $e^{(\Delta_2/\Delta_1)}, e^{(\Delta_3/\Delta_1)}$ (b) $\log(\Delta_1/\Delta_3), \log(\Delta_2/\Delta_3)$ (c) $\log(\Delta_2/\Delta_1), \log(\Delta_3/\Delta_1)$ (d) $e^{(\Delta_1/\Delta_3)}, e^{(\Delta_2/\Delta_3)}$

6) Which of the following is/are correct?
(i) Adjoint of a symmetric matrix is also a symmetric matrix.
(ii) Adjoint of a diagonal matrix is also a diagonal matrix.
(iii) If A is a square matrix of order n and λ is a scalar, then $adj(\lambda.A) = \lambda^n adj(A)$
(iv) A(adjA) = (adjA)A = |A| I
(a) Only (i) (b) (ii) and (iii) (c) (iii) and (iv) (d) (i), (ii) and (iv)

7) Let A be a 3 x 3 matrix and B its adjoint matrix If |B| = 64, then |A| =
(a) ± 2 (b) ± 4 (c) ± 8 (d) ± 12

8) Which of the following is not an elementary transformation?
(a) $R_i \to R_j$ (b) $R_i \to 2R_i + R_j$ (c) $C_j \to C_j + C_i$ (d) $R_i \to R_i + C_j$

9) $i^n + i^{n-1} + i^{n+2} + i^{n+3}$ is (a) 0 (b) 1 (c) - 1 (d) i

10) The conjugate ofa complex number is $\frac{1}{i-2}$. Then the complex number is
(a) *1 / i+2* (b) *-1 / i + 2* (c) *-1 / i-2* (d) *1 / i- 2*

11) If z is a non zero complex number, such that $2iz^2 = \bar{z}$ then |z| is
(a) ½ (b) 1 (c) 2 (d) 3

12) If |z - 3/2| = 2 then the least value |z| is (a) 1 (b) 2 (c) 3 (d) 5

13) If $\frac{z-1}{z+1}$ is purely imaginary, then |z| is (a) ½ (b) 1 (c) 2 (d) 3

14) If z = x + iy is a complex number such that |z+2| = |z-2|, then the locus of z is
(a) real axis (b) imaginary axis (c) ellipse (d) circle

15) The value of $(1 + i)(1 + i^2)(1 + i^3)(1 + i^4)$ is, (a) 2 (b) 0 (c) 1 (d) i

16) The amplitude of 1/i is equal to (a) 0 (b) π/2 (c) - π/2 (d) π

17) A zero of $x^3 + 64$ is (a) 0 (b) 4 (c) 4i (d) -4

18) A polynomial equation in x of degree n always has
(a) n distinct roots (b) n real roots (c) n imaginary roots (d) at most on root

19) If $x^3 + 12x^2 + 10ax + 1999$ definitely has a positive zero, if and only if
(a) a ≥ 0 (b) a > 0 (c) a < 0 (d) a ≤ 0

20) The polynomial $x^3 - kx2 + 9x$ has three real zeros if and only if, k satisfies
(a) | k | ≤ 6 (b) k = 0 (c) |k| > 6 (d) |k| ≥ 6

21) The number of positive zeros of the polynomial $\sum_{j=0}^{n} {}^nC_r (-1)^r x^r$ is
(a) 0 (b) n (c) < n (d) r

22) The quadratic equation whose roots are α and β is
(a) (x - α)(x - β) = 0 (b) (x - α)(x + β) = 0 (c) α + β = b/a (d) αβ = -c/a

23) If $\sin^{-1} x + \sin^{-1} y = 2\pi/3$; then $\cos^{-1} x + \cos^{-1} y$ is equal to
(a) 2π/3 (b) π/3 (c) π/6 (d) π

24) If $\sin^{-1}x = 2\sin^{-1}\alpha$ has a solution, then (a) $|\alpha| \le 1/\sqrt{2}$ (b) $|\alpha| \ge 1/\sqrt{2}$ (c) $|\alpha| < 1/\sqrt{2}$ (d) $|\alpha| > 1/\sqrt{2}$

25) If $\cot^{-1} x = 2\pi/5$, for some x ∈ R, the value of $\tan^{-1} x$ is
(a) -π/10 (b) π/5 (c) π/10 (d) -π/5

26) If |x| ≤ 1, then $2\tan^{-1} x - \sin^{-1} \frac{2x}{1+x^2}$ is equal to (a) $\tan^{-1}x$ (b) $\sin^{-1}x$ (c) 0 (d) π

27) The equation $\tan^{-1} x - \cot^{-1} x = \tan^{-1}(1/\sqrt{3})$ has
(a) no solution (b) unique solution (c) two solutions (d) infinite number of solutions

28) $\sin(\tan^{-1}x)$, $|x| < 1$ is equal to (a) $\frac{x}{\sqrt{1-x^2}}$ (b) $\frac{1}{\sqrt{1-x^2}}$ (c) $\frac{1}{\sqrt{1+x^2}}$ (d) $\frac{x}{\sqrt{1+x^2}}$

29) $\tan^{-1}(\tan 9\pi/8)$ (a) $9\pi/8$ (b) $-9\pi/8$ (c) $\pi/8$ (d) $-\pi/8$

30) The radius of the circle passing through the point(6,2) two of whose diameter are $x + y = 6$ and $x + 2y = 4$ is
(a) 10 (b) $2\sqrt{5}$ (c) 6 (d) 4

31) The radius of the circle $3x^2 + by^2 + 4bx - 6by + b^2 = 0$ is
(a) 1 (b) 3 (c) $\sqrt{10}$ (d) $\sqrt{11}$

32) The equation of the circle passing through the foci of the ellipse $\frac{x^2}{10} + \frac{y^2}{9} = 1$ having centre at (0,3) is
(a) $x^2+y^2-6y-7=0$ (b) $x^2+y^2-6y+7=0$ (e) $x^2+y^2-6y-5=0$ (d) $x^2+y^2-6y+5=0$

33) The area of quadrilateral formed with foci of the hyperbolas $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ and $\frac{x^2}{a^2} - \frac{y^2}{b^2} = -1$
(a) $4(a^2+b^2)$ (b) $2(a^2+b^2)$ (c) a^2+b^2 (d) $\frac{1}{2}(a^2+b^2)$

34) If $x+y=k$ is a normal to the parabola $y^2 = 12x$, then the value of k is
(a) 3 (b) -1 (c) 1 (d) 9

35) Tangents are drawn to the hyperbola $\frac{x^2}{9} - \frac{y^2}{4} = 1$ parallel to the straight line $2x - y = 1$. One of the points ot contact of tangents on the hyperbola is
(a) $\frac{9}{2\sqrt{2}}, \frac{-1}{\sqrt{2}}$ (b) $\frac{-9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}$ (c) $\frac{9}{2\sqrt{2}}, \frac{1}{\sqrt{2}}$ (d) $(3\sqrt{3}, -2\sqrt{2})$

36) Area of the greatest rectangle inscribed in the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ is
(a) 2ab (b) ab (c) $\sqrt{ab}$ (d) a/b

37) If P (x, y) be any point on $4x^2 + 9y^2 = 36$ then the sum of the distances of P from the points $(\sqrt{5}, 0)$ *and* $(-\sqrt{5}, 0)$ is
(a) 4 (b) 8 (c) 6 (d) 18

38) If a vector $\vec{\alpha}$ lies in the plane of $\vec{\beta}$ and $\vec{\gamma}$, then
(a) $[\vec{\alpha},\vec{\beta},\vec{\gamma}] = 1$ (b) $[\vec{\alpha},\vec{\beta},\vec{\gamma}] = -1$ (c) $[\vec{\alpha},\vec{\beta},\vec{\gamma}] = 0$ (d) $[\vec{\alpha},\vec{\beta},\vec{\gamma}] = 2$

39) The volume of the parallelepiped with its edges represented by the vectors $\vec{i}+\vec{j}$, $\vec{i}+2\vec{j}$, $\vec{i}+\vec{j}+\pi\vec{k}$ is
(a) $\pi/2$ (b) $\pi/3$ (c) π (d) $\pi/4$

40) If $\vec{a}=\vec{i}+\vec{j}+\vec{k}$, $\vec{b}=\vec{i}+\vec{j}$, $\vec{c}=\vec{i}$ and $(\vec{a}\times\vec{b})\times\vec{c} = \lambda\vec{a}+\mu\vec{b}$ then the value of $\lambda + \mu$ is
(a) 0 (b) 1 (c) 6 (d) 3

41) If $\vec{a},\vec{b},\vec{c}$ are non-coplanar, non-zero vectors such that $[\vec{a},\vec{b},\vec{c}] = 3$, then $\{[\vec{a}\times\vec{b}, \vec{b}\times\vec{c}, \vec{c}\times\vec{a}]\}^2$ is equal to
(a) 81 (b) 9 12 Maths Page 1 (c) 27 (d) 18

42) If the volume of the parallelepiped with $\vec{a}\times\vec{b}$, $\vec{b}\times\vec{c}$, $\vec{c}\times\vec{a}$ as coterminous edges is 8 cubic units, then the volume of the parallelepiped with $(\vec{a}\times\vec{b})\times(\vec{b}\times\vec{c})$, $(\vec{b}\times\vec{c})\times(\vec{c}\times\vec{a})$ and $(\vec{c}\times\vec{a})\times(\vec{a}\times\vec{b})$ as coterninous edge is,
(a) 8 cubic units (b) 512 cubic units (c) 64 cubic units (d) 24 cubic units

43) If $[\vec{a},\vec{b},\vec{c}] = 1$, ,then the value of $\frac{\vec{a}\cdot(\vec{b}\times\vec{c})}{(\vec{c}\times\vec{a})\cdot\vec{b}} + \frac{\vec{b}\cdot(\vec{c}\times\vec{a})}{(\vec{a}\times\vec{b})\cdot\vec{c}} + \frac{\vec{c}\cdot(\vec{a}\times\vec{b})}{(\vec{c}\times\vec{b})\cdot\vec{a}}$ is
(a) 1 (b) -1 (c) 2 (d) 3

44) If the length of the perpendicular from the origin to the plane $2x + 3y + \lambda z = 1$, $\lambda > 0$ is 1/5 then the value of λ is
(a) $2\sqrt{3}$ (b) $3\sqrt{2}$ (c) 0 (d) 1

45) *If* $\vec{a}\times(\vec{b}\times\vec{c}) = (\vec{a}\times b)\times c$ for non-coplanar vectors *a, b, c* then
(a) $\vec{a}$ parallel to $\vec{b}$ (b) $\vec{b}$ parallel to $\vec{c}$ (c) $\vec{c}$ parallel to $\vec{a}$ (d) $\vec{a}+\vec{b}+\vec{c}=\vec{o}$

46) The position of a particle moving along a horizontal line of any time tis given by $s(t) = 3t^2 - 2t - 8$. The time at which the particle is at rest is (a) $t = 0$ (b) $t = 1/3$ (c) $t = 1$ (d) $t = 3$

47) A stone is thrown up vertically. The height it reaches at time t seconds is given by $x = 80t - 16t^2$. The stone reaches the maximum height in time t seconds is given by, (a) 2 (b) 2.5 (c) 3 (d) 3.5

48) The abscissa of the point on the curve $f(x) = \sqrt{8-2x}$ at which the slope of the tangent is -0.25?
(a) -8 (b) - 4 (c) -2 (d) 0

49) The slope of the line normal to the curve $f(x) = 2\cos 4x$ at $x = \pi/12$ is
(a) $-4\sqrt{3}$ (b) - 4 (c) $\sqrt{3}/12$ (d) $4\sqrt{3}$

50) Angle between $y^2 = x$ and $x^2 = y$ at the origin is (a) $\tan^{-1} 3/4$ (b) $\tan^{-1} 4/3$ (c) $\pi/2$ (d) $\pi/4$

51) The function $\sin^4 x + \cos^4 x$ is increasing in the interval
(a) $\left[\frac{5\pi}{8}, \frac{3\pi}{4}\right]$ (b) $\left[\frac{\pi}{2}, \frac{5\pi}{8}\right]$ (c) $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$ (d) $\left[0, \frac{\pi}{4}\right]$

52) The minimum value of the function $|3 - x| + 9$ is (a) 0 (b) 3 (c) 6 (d) 9

53) One of the closest points on the curve $x^2 - y^2 = 4$ to the point (6, 0) is
(a) (2,0) (b) $(\sqrt{5},1)$ (c) $(3, \sqrt{5})$ (d) $(\sqrt{13}, -\sqrt{3})$

54) The maximum value of the product of two positive numbers, when their sum of the squares is 200, is
(a) 100 (b) $25\sqrt{7}$ (c) 28 (d) $24\sqrt{14}$

55) The point of inflection of the curve $y = (x - 1)^3$ is
(a) (0,0) (b) (0,1) (c) (1,0) (d) (1,1)

56) For what values of x is the rate of increase of $x^3 - 5x^2 + 5x + 8$ is twice the rate of increase of x?
(a) -3, -1/3 (b) -3, 1/3 (c) 3, -1/3 (d) 3, 1/3

57) In the interval (- 3, 3), the function $f(x) = \frac{x}{3} + \frac{3}{x}, x \neq 0$ is
(a) Decreasing (b) Increasing (c) Neither increasing nor decreasing (d) None of these

58) A circular template has a radius of 10 cm. The measurement of radius has an approximate error of 0.02 cm. Then the percentage error in calculating area of this template is (a) 0.2% (b) 0.4% (c) 0.04% (d) 0.08%

59) The percentage error of fifth root of 31 is approximately how many times the percentage error in 31?
(a) 1/31 (b) 1/5 (c) 5 (d) 31

60) If we measure the side ofa cube to be 4 cm with an error of 0.1 cm, then the error in our calculation of the volume is
(a) 0.4 cu.cm (b) 0.45 cu.cm (c) 2 cu.cm (d) 4.8 cu.cm

61) The approximate change in the volume V of a cube of side x metres caused by increasing the side by 1% is
(a) $0.3\, xdx\ m^3$ (b) $0.03\, x\ m^3$ (c) $0.03\, x^2\ m^3$ (d) $0.03\, x^3\ m^3$

62) For the function $y = x^3 + 2x^2$, the value of dy when $x = 2$ and $dx = 0.1$ is
(a) 1 (b) 2 (c) 3 (d) 4

63) The value of $\int_{-4}^{4}\left[tan^{-1}\left(\frac{x^2}{x^4+1}\right) + tan^{-1}\left(\frac{x^4+1}{x^2}\right)\right]dx$ is
(a) π (b) 2π (c) 3π (d) 4π

64) If $f(x) = \int_0^x t\cos t\,dt$, then $df/dx =$
(a) $\cos x - x\sin x$ (b) $\sin x + x\cos x$ (c) $x\cos x$ (d) $x\sin x$

65) The area between $y^2 = 4x$ and its latus rectum is .
(a) 2/3 (b) 4/3 (c) 8/3 (d) 5/3

66) The value of $\int_0^1 \log(x/1-x)\,dx$
(a) 0 (b) 2 (c) 4 (d) 5

67) The value of $\int_0^{\pi/6} \cos^3 3x\,dx$
(a) 2/3 (b) 2/9 (c) 1/9 (d) 1/3

68) The value of $\int_0^{\infty} e^{-3x}x^2 dx$ is
(a) 7/27 (b) 5/27 (c) 4/27 (d) 2/27

69) The value of $\int_0^{\infty} \frac{dx}{\sqrt{4-9x^2}}$ is
(a) $\pi/6$ (b) $\pi/2$ (c) $\pi/4$ (d) π

70) The value of $\int_0^1 (\sin^{-1}x)^2 dx$
(a) $\frac{\pi^2}{4} - 1$ (b) $\frac{\pi^2}{4} + 2$ (c) $\frac{\pi^2}{4} + 1$ (d) $\frac{\pi^2}{4} - 2$

71) $\int_0^{\pi/2} \frac{\sin x}{1+\cos^2 x}dx =$ YouTube/ Akwa Academy
(a) $\pi/2$ (b) π (c) $\pi/4$ (d) 0

72) $\int_{-\pi/2}^{\pi/2} x\sin x\,dx =$
(a) 0 (b) 2 (c) 4 (d) -2

73) The order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)+\left(\frac{dy}{dx}\right)^{1/3} + x^{1/4} = 0$ are respectiely
(a) 2, 3 (b) 3, 3 (c) 2, 6 (d) 2, 4

74) The differential equation representing the family of curves $y = A\cos(x + B)$, where A and B are parameters is
(a) $\frac{d^2y}{dx^2} - y = 0$ (b) $\frac{d^2y}{dx^2} + y = 0$ (c) $\frac{d^2y}{dx^2} = 0$ (d) $\frac{d^2x}{dy^2} = 0$

75) The general solution of the differential equation $dy/dx = y/x$ is
(a) $xy = k$ (b) $y = k\log x$ (c) $y = kx$ (d) $\log y = kx$

76) The solution of $\frac{dy}{dx} + p(x)y = 0$ is
(a) $y = ce^{\int p dx}$ (b) $y = ce^{-\int p dx}$ (c) $y = ce^{-\int p dy}$ (d) $x = ce^{\int p dy}$

77) The degree of the differential equation $y(x) = 1 + \left(\frac{dy}{dx}\right) + \frac{1}{1.2}\left(\frac{dy}{dx}\right)^2 + \frac{1}{1.2.3}\left(\frac{dy}{dx}\right)^3 + \cdots$ is
(a) 2 (b) 3 (c) 1 (d) 4

78) If p and q are the order and degree of the differential equation $y = \frac{dy}{dx} + x^3\left(\frac{d^2y}{dx^2}\right) + xy = \cos x$, when
(a) p < q (b) p = q (c) p > q (d) p exists and q does not exist

79) The solution of the differential equation $\frac{dy}{dx} + \frac{1}{\sqrt{1-x^2}} = 0$ is
(a) $y + \sin^{-1} x = c$ (b) $x + \sin^{-1} y = 0$ (c) $y^2 + 2\sin^{-1} x = c$ (d) $x^2 + 2\sin^{-1} y = c$

80) The solution of the differential equation $dy/dx = 2xy$ is
(a) $y = Ce^{x^2}$ (b) $y = 2x^2 + 2$ (c) $y = Ce^{-x^2} + c$ (d) $y = x^2 + c$

81) The general solution of the differential equation $\log(dy/dx) = x + y$ is
(a) $e^x + e^y = C$ (b) $e^x + e^{-y} = C$ (c) $e^{-x} + e^y = C$ (d) $e^{-x} + e^{-y} = C$

82) The solution of $dy/dx = 2^{y-x}$ is
(a) $2^x + 2^y = C$ (b) $2^x - 2^y = C$ (c) $1/2^x - 1/2^y = C$ (d) $x + y = C$

83) P is the amount of certain substance left in after time t. If the rate of evaporation of the substance is proportional to the amount remaining, then
(a) $P = Ce^{kt}$ (b) $P = Ce^{-kt}$ (c) $P = Ckt$ (d) $Pt = C$

84) The solution of the DE $y\frac{dz}{dy} = \cot x$ is
(a) $\sec x = cy$ (b) $\sec y = cx$ (c) $\sec y = c$ (d) $\sec x = c$

85) Let X be random variable with probability density function $f(z) = \begin{cases} 2/x^3 & x \geq 1 \\ 0 & x < 1 \end{cases}$ Which of the following statement is correct
(a) both mean and variance exist (b) mean exists but variance does not exist
(c) both mean and variance do not exist (d) variance exists but Mean does not exist

86) A pair of dice numbered 1, 2, 3, 4, 5, 6 of a six-sided die and 1, 2, 3, 4 of a four-sided die is rolled and the sum is determined. Let the random variable X denote this sum. Then the number of elements in the inverse image of 7 is
(a) 1 (b) 2 (c) 3 (d) 4

87) Let X represent the difference between the number of heads and the number of tails obtained when a coin is tossed n times. Then the possible values of X are
(a) i+2n, i=0,1,2... n (b) 2i-n, i=0,1,2... n (c) n-i, i=0,1,2... n (d) 2i+2n, i=0,1,2...n

88) Suppose that X takes on one of the values 0, 1 and 2. If for some constant k, $P(X = i) = kP(X = i - 1)$ for i = 1, 2 and $P(X = 0) = 1/7$, then the value of k is
(a) 1 (b) 2 (c) 3 (d) 4

89) Which of the following is a discrete random variable?
I. The number of cars crossing a particular signal in a day
II. The number of customers in a queue to buy train tickets at a moment
III. The time taken to complete a telephone call.
(a) I and II (b) II only (c) III only (d) II and III

90) If $f(x) = \begin{cases} 2x & 0 \leq x \leq a \\ 0 & \text{otherwise} \end{cases}$ is a probability density function of a random variable, then the value of a is
(a) 1 (b) 2 (c) 3 (d) 4

91) The probability mass function of a discrete random variable $f(x)$ is
(a) $f(x) = 1$ (b) $f(x) \geq 1$ (c) $f(x) \geq 0$ (d) $f(x) = 0$

92) Four buses carrying 160 students from the same school arrive at a football stadium. The buses carry, respectively, 42, 36, 34, and 48 students. One of the students is randomly selected. Let X denote the number of students that were on the bus carrying the randomly selected student. One of the 4 bus drivers is also randomly selected. Let Y denote the number of students on that bus. Then E(X) and E(Y) respectively are
(a) 50,40 (b) 40,50 (c) 40.75,40 (d) 41, 41

93) Subtraction is not a binary operation in
(a) R (b) Z (c) N (d) Q

94) In the set Q define a⊙b = a+b+ab. For what value of y, 3⊙(y⊙5) = 7?
(a) y = 2/3 (b) y = -2/3 (c) y = -3/2 (d) y = 4

95) If $a * b = \sqrt{a^2 + b^2}$ on the real numbers then * is
(a) commutative but not associative (b) associative but not commutative
(c) both commutative and associative (d) neither commutative nor associative

96) Which one of the following statements has the truth value T?
(a) sin x is an even function (b) Every square matrix is non-singular
(c) The product of complex number and its conjugate is purely imaginary (d) √5 is an irrational number

97) In the last column of the truth table for ¬(p V ¬q) the number of final outcomes of the truth value 'F' are
(a) 1 (b) 2 (c) 3 (d) 4

98) The truth table for (p ∧ q) V ¬q is given below

p	q ¬q	(p ∧ q) V (¬q)
T	T F	(a)
T	F T	(b)
F	T F	(c)
F	F T	(d)

Which one of the following is true?

(a)

(a)	(b)	(c)	(d)
T	T	T	T

(b)

(a)	(b)	(c)	(d)
T	F	T	T

(c)

(a)	(b)	(c)	(d)
T	T	F	T

(d)

(a)	(b)	(c)	(d)
T	F	F	F

99) Which one of the following is incorrect? For any two propositions p and q, we have
(a) ¬(pVq) ≡ ¬p ∧ ¬q (b) ¬(p ∧ q) ≡ ¬p V ¬q (c) ¬(p V q) ≡ ¬p V ¬q (d) ¬(¬p) ≡ p

100) On the set R of real numbers, the operation * is defined by $a * b = a^2 - b^2$. Then (3*5)*4 is
(a) -240 (b) 240 (c) -72 (d) 72