CUET 2025 Paper 2

1. The value of

$$\int \frac{x^5}{\sqrt{1+x^3}}dx$$

is:

(1) $$\frac{2}{9}(1+x^3)^{3/2} - \frac{2}{3}(1+x^3)^{\frac{1}{2}} + c$$

(2) $$\frac{2}{3}(1+x^3)^{3/2} - \frac{2}{3}(1+x^3)^{\frac{1}{2}} + c$$

(3) $$\frac{1}{3}(1+x^3)^{3/2} + \frac{1}{3}(1+x^3)^{\frac{1}{2}} + c$$

(4) $$\frac{2}{9}(1+x^3)^{3/2} + \frac{2}{3}(1+x^3)^{\frac{1}{2}} + c$$

2. If A and B are invertible matrices of the same order, then $(\mathrm{AB})^{-1}$ is equal to:

(1) $\mathrm{A}^{-1}\ \mathrm{B}^{-1}$
(2) $\mathrm{A}^{-1}\ \mathrm{B}$
(3) $\mathrm{B}^{-1}\ \mathrm{A}^{-1}$
(4) $\mathrm{A}\ \mathrm{B}^{-1}$

3. The corner points of the bounded feasible region determined by the system of linear constraints are (15,0), (40,0), (4,18) and (6, 12). If objective function is $z = 30x + 20y$, then the sum of the maximum and the minimum values of z is:

(1) 900
(2) 1650
(3) 1620
(4) 1680

4. If $f(x) = \begin{vmatrix} 0 & x-1 & x-2 \\ x+1 & 0 & x-3 \\ x+2 & x+3 & 0 \end{vmatrix}$, then the value of $f(0)$ is equal to:

(1) -1
(2) 1
(3) -2
(4) 0

5. The area of the region bounded by the parabola $y^2 = x$ and the straight line $2y = x$ is:

(1) 7/3 sq. units
(2) 5/3 sq. units
(3) 4/3 sq. units
(4) 2/3 sq. units

6. Let $A = [a_{ij}]$ is given by $A = \begin{bmatrix} 1 & -1 & 2 \\ 3 & 4 & -5 \\ 2 & -1 & 3 \end{bmatrix}$. Then the matrix $B = [b_{ij}]$, where $b_{ij} =$ Minor of a_{ij}, is:

(1) $\begin{bmatrix} 7 & 19 & -11 \\ -1 & -1 & 1 \\ -3 & -11 & 7 \end{bmatrix}$

(2) $\begin{bmatrix} 7 & -19 & 11 \\ 5 & -1 & -1 \\ 2 & 11 & 7 \end{bmatrix}$

(3) $\begin{bmatrix} 7 & -5 & -3 \\ 19 & 1 & -11 \\ -11 & 1 & 7 \end{bmatrix}$

(4) $\begin{bmatrix} 7 & 19 & -11 \\ -3 & 11 & 7 \\ -2 & -1 & -1 \end{bmatrix}$

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7. Which one of the following equations is a homogeneous differential equation?

(1) $(4x+5)dy+(3y-4)dx=0$
(2) $x^2y\,dx-(x^3+y^3)dy=0$
(3) $(x^3+2y^2x)dy+2xy\,dx=0$
(4) $x^2dy-y^2dx=\sqrt{x^2+y^2}dx$

8. The interval on which the function $f(x)=x^3+2x^2-1$ is decreasing, is

(1) $(-\infty,-4/3)$
(2) $[0,\infty)$
(3) $[-4/3,0)$
(4) $[-4/3,\infty)$

9. If $y=(x+1)(x^2+1)(x^4+1)(x^8+1)$ then $\frac{dy}{dx}$ at $x=-1$ is:

(1) 8
(2) -8
(3) 16
(4) -16

10. The value of $\int_{-1}^{1}|x^3-x|dx$ is:

(1) 0
(2) $\frac{1}{4}$
(3) $\frac{1}{2}$
(4) 1

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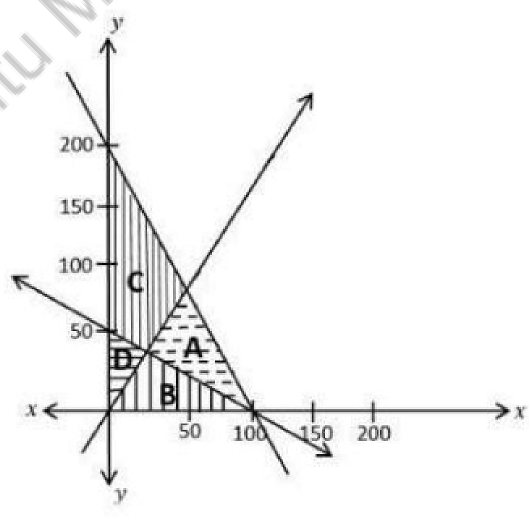
11. The particular solution of the differential equation $\frac{dy}{dx}+\frac{3y}{x}=0$, $y(1)=1$ is:

(1) $y=\frac{1}{x^3}$
(2) $y=\frac{1}{x^2}$
(3) $x=\frac{1}{y}$
(4) $x=\frac{1}{y^2}$

12. The feasible region represented by the constraints: $x+2y\geq 100$, $2x-y\leq 0$, $2x+y\leq 200$, $x\geq 0, y\geq 0$ of an LPP is:



(1) Region A
(2) Region B
(3) Region C
(4) Region D

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13. For the function $f(x) = e^{-2x}(2-x)^2$, the point of local maxima is:

(1) $x = 1$
(2) $x = 2$
(3) $x = 3$
(4) $x = 5/2$

14. Two cards are drawn simultaneously at random from a well shuffled pack of 52 Cards. Let X be the random variable which denotes number of kings in the draw. Then the probability distribution of X is

1.

X	0	1	2
P(X)	$\frac{^{48}C_2}{^{52}C_2}$	$\frac{^4C_1 \times {^{48}C_1}}{^{52}C_2}$	$\frac{^4C_2}{^{52}C_2}$

2.

X	0	1	2
P(X)	$\frac{^4C_0}{^{52}C_2}$	$\frac{^4C_1}{^{52}C_2}$	$\frac{^4C_2}{^{52}C_2}$

3.

X	0	1	2
P(X)	$\frac{^4C_2}{^{52}C_2}$	$\frac{^4C_1 \times {^{48}C_1}}{^{52}C_2}$	$\frac{^{48}C_2}{^{52}C_2}$

4.

X	0	1	2
P(X)	$\frac{^4C_0}{^{52}C_2}$	$\frac{^{48}C_1}{^{52}C_2}$	$\frac{^4C_2}{^{52}C_2}$

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15. If A and B are symmetric matrices of the same order, then which of the following are true?
(A) AB – BA is a skew symmetric matrix
(B) AB is a symmetric matrix
(C) AB is a scalar matrix
(D) AB + BA is a symmetric matrix

(1) (A), (B) and (C) only
(2) (A) and (D) only
(3) (C) and (D) only
(4) (B), (C) and (D) only

16. Let L_1 and L_2 be two lines, represented as,
$L_1 : \vec{r} = \hat{i} + \hat{j} + \lambda(2\hat{i} - \hat{j} + \hat{k})$ and
$L_2 : \vec{r} = 2\hat{i} + \hat{j} - \hat{k} + \mu(4\hat{i} - 2\hat{j} + 2\hat{k})$, where λ and μ are scalars. Then which of the following are true?
(A) L_1 is perpendicular to L_2
(B) L_1 is parallel to L_2
(C) L_1 passes through the point (1, 1, 0)
(D) L_2 passes through the point (2, 1, -1)

(1) (A) and (D) only
(2) (B), (C) and (D) only
(3) (C) and (D) only
(4) (A) and (C) only

17. The area (in sq. units) of the region enclosed by the curve $y = \cos x$, $-\frac{\pi}{2} \leq x \leq \frac{\pi}{2}$ and the x-axis is:

(1) 1
(2) 2
(3) 4
(4) 3

18. $\int e^{-x}(\cot x + \csc^2 x)dx =$

(1) $e^{-x}\cot x + c$, where c is an arbitrary constant.
(2) $-e^{-x}\cot x + c$, where c is an arbitrary constant.
(3) $-e^{-x}\csc^2 x + c$, where c is an arbitrary constant.
(4) $e^{-x}\csc^2 x + c$, where c is an arbitrary constant.

19. The corner points of the bounded feasible region determined by a set of constraints in an LPP are P(0, 5), Q(3, 5), R(5, 0) and S(4, 1). If the objective function is $z = ax + by$, where $a, b > 0$, then the condition on a and b such that the maximum value of z occurs at Q and S is:

(1) $a - 5b = 0$
(2) $a - 3b = 0$
(3) $a - 2b = 0$
(4) $a - 8b = 0$

20. The projection of the vector $5\hat{i} + \hat{j} - 3\hat{k}$ on the vector $\hat{i} + 2\hat{j} - 3\hat{k}$ is:

(1) $\frac{16}{\sqrt{14}}$
(2) $\frac{8}{7}$
(3) $\frac{15}{13}$
(4) $\frac{16}{\sqrt{35}}$

21. Match List-I with List-II

List-I	List-II
(A) Line: $x = 2y + 1 = z - 1$	(I) Crosses xz plane at (1, 0, 1)
(B) Line: $x + 1 = 2y + 1 = z$	(II) Crosses xz plane at (0, 0, 1)
(C) Line: $x - 1 = 2y = z + 1$	(III) Crosses xz plane at (1, 0, -1)
(D) Line: $x - 1 = 2y = z - 1$	(IV) Crosses xz plane at (1, 0, 2)

Choose the correct answer from the options given below:

(1) (A) - (IV), (B) - (II), (C) - (III), (D) - (I)
(2) (A) - (II), (B) - (IV), (C) - (III), (D) - (I)
(3) (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
(4) (A) - (II), (B) - (III), (C) - (IV), (D) - (I)

22. The domain of the function $y = \sin^{-1}(x - 1) + \cos^{-1}\sqrt{x} - 1$ is:

(1) $[-1, 1]$
(2) $[0, 1]$
(3) $[1, 2]$
(4) $[0, 2]$

23. The following system of equations:

$$x + y - z = 7$$

$$4x + 2y - 2z = 3$$

$$3x + 2y - 4z = 5$$

does not possess a solution if the value of λ is:

(1) 3
(2) -3
(3) -4
(4) 4

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24. The solution of the differential equation $(x^2 + xy)dy = (x^2 + y^2)dx$ is:

(1) $y + \log_e \left|\frac{y-2}{x}\right| = c$, ($c$ is an arbitrary constant)

(2) $\frac{y}{x} + \log_e \left|\frac{(y-x)^2}{x}\right| = c$, ($c$ is an arbitrary constant)

(3) $y - \log_e \left|\frac{y-x}{x}\right| = c$, ($c$ is an arbitrary constant)

(4) $y^2 + \log_e \left|\frac{(y-x)^2}{x}\right| = c$, ($c$ is an arbitrary constant)

25. Which of the following statements are true?
(A) The vector joining the points $P(2, 3, 0)$ and $Q(-1, -2, -4)$ directed from P to Q is $\overrightarrow{PQ} = -3\mathbf{i} - 5\mathbf{j} - 4\mathbf{k}$
(B) Projection of a vector $\vec{a}$ on other vector $\vec{b}$ is $\frac{\vec{a} \cdot \vec{b}}{|\vec{a}|}$
(C) If $\vec{a} = \mathbf{i} - 2\mathbf{j} + \mathbf{k}$ and $\vec{b} = -2\mathbf{i} + 4\mathbf{j} + 5\mathbf{k}$ then $\vec{a} + \vec{b} = -\mathbf{i} + 2\mathbf{j} + 6\mathbf{k}$
(D) If θ is the angle between $\vec{a}$ and $\vec{b}$ then $\cos\theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}||\vec{b}|}$

(1) (A), (C) and (D) only

(2) (A), (B) and (C) only

(3) (B), (C) and (D) only

(4) (C), (B) and (D) only

26. Let box I contains 3 black and 4 white balls, box II contains 2 black and 2 white balls, box III contains 4 black and 3 white balls. A box is selected at random and then a ball is randomly drawn from the selected box. If the color of the ball is black then the probability that the ball is drawn from box III, is:

(1) $\frac{1}{7}$

(2) $\frac{4}{21}$

(3) $\frac{8}{21}$

(4) $\frac{9}{21}$

27. If $y = \sqrt{\sin x + \sqrt{\sin x + \sqrt{\sin x + \cdots + \infty}}}$ then $\frac{dy}{dx}$ equals to:

(1) $\frac{-\cos x}{2y-1}$

(2) $\frac{\cos x}{2y-1}$

(3) $\frac{\sin x}{1-2y}$

(4) $\frac{1-2y}{\cos x}$

28. Match List-I with List-II

List-I	List-II
(A) $\tan^{-1}\frac{2}{11} + \tan^{-1}\frac{7}{24}$	(I) $\frac{3\pi}{4}$
(B) $\tan^{-1} 2 + \tan^{-1} 3$	(II) π
(C) $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3$	(III) $\tan^{-1}\frac{1}{2}$
(D) $\tan^{-1}\frac{1}{7} + \tan^{-1}\frac{1}{13}$	(IV) $\tan^{-1}\frac{2}{9}$

Choose the correct answer from the options given below:

(1) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

(2) (A) - (III), (B) - (I), (C) - (II), (D) - (IV)

(3) (A) - (II), (B) - (IV), (C) - (I), (D) - (III)

(4) (A) - (IV), (B) - (I), (C) - (III), (D) - (II)

29. If $\begin{vmatrix} p-a & 0 & c-r \\ 0 & q-b & c-r \\ a & b & r \end{vmatrix} = 0$ then the value of $\frac{p}{p-a} + \frac{q}{q-b} + \frac{r}{r-c}$ is:

(1) 0

(2) 1

(3) 2

(4) 3

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30. If $x = a\sec^3\theta$, $y = a\tan^3\theta$, then $\frac{d^2y}{dx^2}$ equals:

(1) $\frac{\cos^5\theta}{3a\sin\theta}$
(2) $\frac{3a\cos^5\theta}{\sin\theta}$
(3) $\frac{\sin^5\theta}{3a\cos\theta}$
(4) $\frac{3a\sin^5\theta}{\cos\theta}$

31. The area of the region bounded by the curves $y = x$ and $y = x^3$ is:

(1) 1 sq. units
(2) $\frac{3}{4}$ sq. units
(3) $\frac{1}{2}$ sq. units
(4) $\frac{1}{4}$ sq. units

32. Match List-I with List-II

List-I	**List-II**
(A) If vectors $\vec{a}$ and $\vec{b}$ are such that $\vec{a} = \lambda\vec{b}$ and $\lvert\vec{a}\rvert = \lvert\vec{b}\rvert$, then	(I) $\vec{a}$ and $\vec{b}$ are orthogonal
(B) Projection vector of $\vec{a}$ on $\vec{b}$	(II) [0, 12]
(C) $\vec{a}$ and $\vec{b}$ are non-zero vectors such that $\lvert\vec{a}+\vec{b}\rvert = \lvert\vec{a}-\vec{b}\rvert$ then	(III) $\vec{a} = \pm\vec{b}$
(D) If $\lvert\vec{a}\rvert = 4$, $-3 \le \lambda \le 2$, then the range of $\lvert\lambda\vec{a}\rvert$	(IV) $\left(\frac{\vec{a}\cdot\vec{b}}{\lvert\vec{b}\rvert^2}\right)\vec{b}$

Choose the correct answer from the options given below:

(1) (A) - (III), (B) - (IV), (C) - (II), (D) - (I)
(2) (A) - (I), (B) - (III), (C) - (IV), (D) - (II)
(3) (A) - (III), (B) - (IV), (C) - (I), (D) - (II)
(4) (A) - (I), (B) - (III), (C) - (II), (D) - (IV)

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33. If c_{ij} denotes the cofactor of element a_{ij} of the matrix $A = \begin{bmatrix} 1 & 2 & -1 \\ 0 & -3 & 2 \\ 4 & 2 & 3 \end{bmatrix}$, then the value of $c_{21} \cdot c_{33}$ is:

(1) -8
(2) -3
(3) -24
(4) 24

34. A coin is tossed and a die is thrown. The probability that the outcome will be a tail on the coin or a number greater than 3 on the die is:

(1) $\frac{3}{4}$
(2) $\frac{1}{4}$
(3) $\frac{1}{2}$
(4) 0

35. If A is a square matrix such that $A^2 = A$ and I is the identity matrix of same order as A, then the value of $(A-2I)^2 - (2A+I)^2 + 11A$ is:

(1) I
(2) 2I
(3) 3I
(4) -I

36. Match List-I with List-II

List-I	**List-II**
(A) The degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^2 + \left(\frac{dy}{dx}\right)^2 = x\sin\left(\frac{dy}{dx}\right)$	(I) 4
(B) The degree of differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^{1/4} + x^{1/5} = 0$	(II) 1
(C) The degree of differential equation $\frac{d^2y}{dx^2} + \left(\frac{dy}{dx}\right)^3 + 6y^5 = 0$	(III) Not defined
(D) The degree of differential equation $1 + \left(\frac{dy}{dx}\right)^4 = 7\left(\frac{d^2y}{dx^2}\right)^3$	(IV) 3

Choose the correct answer from the options given below:

(1) (A) - (IV), (B) - (III), (C) - (II), (D) - (I)
(2) (A) - (III), (B) - (I), (C) - (II), (D) - (IV)
(3) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)
(4) (A) - (III), (B) - (IV), (C) - (I), (D) - (II)

37. If $f(x) = \sin x - \cos x, x \in [0, 2\pi]$ then which of the following are true?
(A) $f(x)$ is increasing in $\left(0, \frac{3\pi}{4}\right)$
(B) $f(x)$ is decreasing in $\left(0, \frac{3\pi}{4}\right)$
(C) $f(x)$ is decreasing in $\left(\frac{3\pi}{4}, \frac{7\pi}{4}\right)$
(D) $f(x)$ is decreasing in $\left(\frac{7\pi}{4}, 2\pi\right)$

(1) (A), (D) and (C) only
(2) (B), (C) and (D) only
(3) (A) and (C) only
(4) (B) and (D) only

38. If $\vec{a}$ is a unit vector and $(\vec{x} - \vec{a}) \cdot (\vec{x} + \vec{a}) = 15$ then the value of $|\vec{x}|$ is:

(1) 0
(2) 16
(3) 4
(4) 2

39. For the LPP: minimize $z = 6x + 3y$ subject to the constraints
$4x + y \geq 80$
$x + 5y \geq 115$
$3x + 2y \leq 150$
$x \geq 0, y \geq 0$, then the minimum value of z is:

(1) 150
(2) 228
(3) 120
(4) 100

40. $\int \frac{e^{2x}-1}{e^{2x}+1} dx =$

(1) $\log |e^x + e^{-x}| + C$, where C is an arbitrary constant
(2) $\log \left|e^{2x} + 1\right| + C$, where C is an arbitrary constant
(3) $\log \left|e^{2x} - e^{-x}\right| + C$, where C is an arbitrary constant
(4) $\log \left|e^{2x} - 1\right| + C$, where C is an arbitrary constant

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41. Match List-I with List-II

List-I	List-II
(A) The number of possible matrices of order 3×3 with each entry 1 or 0	(I) 2^4
(B) The number of possible matrices of order 2×3 with each entry 1 or 0	(II) 2^9
(C) The number of possible matrices of order 2×3 with each entry 0,1,2	(III) 2^6
(D) The number of possible matrices of order 2×2 with each entry 1 or 0	(IV) 3^6

Choose the **correct** answer from the options given below:

(1) (A) - (II), (B) - (III), (C) - (IV), (D) - (I)
(2) (A) - (III), (B) - (I), (C) - (IV), (D) - (II)
(3) (A) - (IV), (B) - (I), (C) - (II), (D) - (III)
(4) (A) - (I), (B) - (II), (C) - (III), (D) - (IV)

42. If $P(A) = \frac{3}{5}, P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{4}$, then $P(\overline{A} \mid \overline{B})$ is:

(1) $\frac{3}{40}$
(2) $\frac{3}{10}$
(3) $\frac{17}{20}$
(4) $\frac{17}{40}$

43. The function $f : \mathbb{R} \to [-1, 1]$ defined by $f(x) = \cos x$ is:

(1) one-one but not onto
(2) onto but not one-one
(3) Both one-one and onto
(4) Neither one-one nor onto

44. For $x \in \mathbb{R}$, if $f(x) = -(x-1)^2 + 2$, then
(A) f is an increasing function on $(-\infty, 1]$
(B) f has no critical points
(C) f has a maximum value at $x = 1$
(D) f has a minimum value at $x = 1$
Choose the correct answer from the options given below:

(1) (B) and (D) only
(2) (B), (C) and (D) only
(3) (A) and (C) only
(4) (A) and (B) only

45. A balloon which always remains spherical, has a variable diameter $\frac{3}{2}(5x + 7)$. Then the rate of change of its volume with respect to x is:

(1) $\frac{27}{8}(5x + 7)^2$
(2) $\frac{27}{16}(5x + 7)^2$
(3) $\frac{135\pi}{8}(5x + 7)^2$
(4) $\frac{135\pi}{16}(5x + 7)^2$

46. $\int \frac{dx}{e^x + e^{-x}}$ is equal to:

(1) $\tan^{-1}(e^x) + c$, c is an arbitrary constant
(2) $\tan^{-1}(e^{-x}) + c$, c is an arbitrary constant
(3) $\log(e^x - e^{-x}) + c$, c is an arbitrary constant
(4) $\log(e^x + e^{-x}) + c$, c is an arbitrary constant

47. If $f(x) = \begin{cases} ax - 1 & \text{if } x \geq 1 \\ 2x + 1 & \text{if } x < 1 \end{cases}$ is continuous at $x = 1$, then a equals:

(1) 0
(2) 3
(3) 4
(4) 2

48. Cosine of the acute angle between the lines $\frac{x-3}{2} = \frac{y-2}{1} = \frac{z-5}{2}$ and $\frac{x-1}{6} = \frac{y-3}{-3} = \frac{z+6}{2}$ is:

(1) $\frac{11}{21}$
(2) $\frac{13}{21}$
(3) $\frac{10}{21}$
(4) $\frac{8}{21}$

49. If A and B are independent events, then which of the following is/are true?
(A) $\overline{A}$ and B are independent events
(B) $P(A \cap B) = 0$
(C) $\overline{A}$ and $\overline{B}$ are independent events
(D) $P(A \cap B) = P(A) + P(B)$
Choose the correct answer from the options given below:

(1) (A) and (C) only
(2) (A), (B) and (D) only
(3) (B) and (D) only
(4) (C) only

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50. If A and B are square matrices of order 3 such that $|A| = -1$, $|B| = 5$, then the value of $|2AB|$ is:

(1) -40

(2) -10

(3) 20

(4) -20

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