CUET Mathematics Mock Test (2025)
Section A - Compulsory (15 Questions)

1. If x + y <= 10, 2x + y >= 6, x >= 0, y >= 0, and Z = ax + by has maximum at (4, 2), find the relation between
a and b.
(A) a = 2b
(B) a = b
(C) b = 2a
(D) a = 3b

2. Find dy/dx if y = e^(2x) * sin(x)
(A) 2e^(2x)sin(x) + e^(2x)cos(x)
(B) e^(2x)(2sin(x) + cos(x))
(C) e^(x)(sin(x) + cos(x))
(D) None

3. A coin is tossed 3 times. What is the probability of getting exactly 2 heads?
(A) 1/8
(B) 3/8
(C) 1/2
(D) 3/4

4. The area bounded by y = x^2 and y = 4 is:
(A) 8
(B) 16/3
(C) 4
(D) 32/3

5. Find the determinant of matrix [[1,2],[3,4]]
(A) -2
(B) 10
(C) -1
(D) 2

6. If a matrix A is such that A^2 = I, what is |A|?
(A) 1
(B) -1
(C) 0
(D) Cannot determine

7. Find the solution to dy/dx = 3x^2 + 2x
(A) x^3 + x^2 + C
(B) x^3 + x + C
(C) x^2 + C
(D) x^3 + 2x + C

8. A bag has 3 red and 2 blue balls. What is the probability of drawing a red ball?
(A) 3/5
(B) 1/2
(C) 2/5
(D) 1/3

9. If A and B are symmetric matrices, what is AB - BA?
(A) Symmetric
(B) Skew-symmetric
(C) Identity
(D) Zero

10. Find the local maxima of f(x) = x^3 - 3x^2 + 4
(A) x = 1
(B) x = 2
(C) x = 0
(D) x = -1

11. If A is 3x3 and |A| = 2, find |2A|
(A) 8
(B) 16
(C) 64
(D) 6

12. Solve: (x^2 + 1) dx
(A) x^3/3 + x + C
(B) x^2/2 + x + C
(C) x^3 + x + C
(D) None

13. Find the expected value if X = 1 with p=0.3, X = 2 with p=0.7
(A) 1.7
(B) 2
(C) 1.5
(D) 1.3

14. If f(x) = |x|, is it differentiable at x = 0?
(A) Yes
(B) No
(C) Sometimes
(D) None

15. Direction cosines of a line parallel to (2,3,6) are:
(A) 2/7, 3/7, 6/7
(B) 1/2, 1/3, 1/6
(C) 1/7, 1/7, 1/7
(D) None

Section B1 – Mathematics Questions

Q16. Let A and B be two matrices of order 2×2 such that AB = BA and

A = [[1, 2],

[0, 1]].Then which of the following is always true?
(A) B is symmetric
(B) B is diagonal

(C) AB = BA implies A and B are simultaneously diagonalizable
(D) B is skew-symmetric

Q17. If f(x) = log(sin x), then f'(x) is defined for:
(A) $x \in (0, \pi)$
(B) $x \in (0, \pi/2)$
(C) $x \in (0, \pi) \cup (\pi, 2\pi)$
(D) $x \in \mathbb{R} - \{0\}$

Q18. Evaluate the integral: $\int_0^1 (x \ln x)\, dx$
(A) -1/4
(B) -1/2
(C) 0
(D) 1/4

Q19. If the sum of two vectors **a** and **b** is perpendicular to their difference, then:
(A) |a| = |b|
(B) $a \cdot b = 0$
(C) a = -b
(D) $a \times b = 0$

Q20. The solution of the differential equation $dy/dx = (x + y)/(x - y)$ is:
(A) $x^2 - y^2 = C$
(B) $x^2 + y^2 = C$
(C) $xy = C$
(D) $x - y = C$

Q21. A linear programming problem is being solved graphically. If the feasible region is unbounded, which of the following is necessarily true?
(A) Maximum value exists
(B) Minimum value exists
(C) Both max and min exist
(D) Minimum or maximum may not exist

Q22. Evaluate: $\lim_{x \to \infty} [(x + 1)/(x - 1)]^x$
(A) e^2

(B) e
(C) e^{-2}
(D) Does not exist

Q23. The eigenvalues of a matrix A = [[2,0], [0, 3]] are:
(A) 2 and 3
(B) 0 and 1
(C) 3 and -3
(D) Not defined

Q24. If vectors a = i + 2j - 3k and b = 4i - j + 2k, then the angle between them is:
(A) Acute
(B) Obtuse
(C) 90°
(D) Cannot be determined without magnitudes

Q25. The function f(x) = $|x^2 - 1|$ is:
(A) Differentiable everywhere
(B) Not differentiable at x = 1 and -1
(C) Differentiable only at x = 0
(D) Continuous but not differentiable anywhere

Q26. If the function $f(x) = x^3 + ax^2 + bx + c$ has a local minimum at x = 1 and local maximum at x = -1, then:
(A) a = 0, b = -3
(B) a = 0, b = 0
(C) a = 0, b = 3
(D) a = -3, b = 0

Q27. The value of the determinant

[[1 a a^2],
[1 b b^2],
[1 c c^2]]

is:
(A) (b - a)(c - a)(c - b)
(B) (a - b)(b - c)(c - a)
(C) (a + b + c)^2
(D) 0

Q28. If A is a square matrix such that $A^2 = I$ and $A \neq I$, then:
(A) A is orthogonal
(B) A is singular
(C) det(A) = 0
(D) A is skew-symmetric

Q29. Find the derivative of $f(x) = \tan^{-1}(2x / (1 - x^2))$
(A) $2 / (1 + x^2)$
(B) $1 / (1 + x^2)$
(C) $2 / (1 - x^2)$
(D) $1 / (1 - x^2)$

Q30. Evaluate $\int_0^{\pi} x \cdot \sin(x)\, dx$
(A) π
(B) π^2
(C) 0
(D) 2

Q31. Find the number of 3-digit numbers that are divisible by 7
(A) 128
(B) 129
(C) 130
(D) 127

Q32. If the variance of 5 observations is 4, then standard deviation is:
(A) 2
(B) 16
(C) √5
(D) 1

Q33. Let $z = x^2 + y^2$ subject to the constraint $x + y = 1$. Find the maximum value using Lagrange multipliers.
(A) 1
(B) 1/2
(C) 3/4
(D) 2

Q34. The dot product of two unit vectors is 1. Then the angle between them is:
(A) 0°
(B) 45°
(C) 90°
(D) 180°

Q35. Find the particular solution of the differential equation dy/dx = y, given that y(0) = 2.
(A) y = 2e^x
(B) y = e^x + 2
(C) y = e^(2x)
(D) y = 2x

Q36. If $\int_0^{\pi} (1 + \cos x)\, dx = A$, then A =
(A) π
(B) 2π
(C) 0
(D) π/2

Q37. The function $f(x) = x^3 - 6x^2 + 12x + 5$ is increasing for:
(A) $x > 2$
(B) $x < 1$
(C) $x \in \mathbb{R}$
(D) $x > 0$

Q38. Find the value of

$$\lim_{x \to 0} \frac{1-\cos(x)}{x^2}$$

(A) 0
(B) 1
(C) 1/2
(D) ∞

Q39. A matrix is said to be singular if:
(A) Determinant is zero
(B) Trace is zero

(C) It is symmetric
(D) It is invertible

Q40. The maximum value of f(x) = sin x + cos x is:
(A) √2
(B) 1
(C) 2
(D) None

Q41. The projection of vector **a** on **b** is given by:
(A) (a · b) / |b|
(B) (a · b) / |a|
(C) (a · b) / |a||b|
(D) |a| cos(θ)

Q42. The feasible region for an LPP is always:
(A) Convex
(B) Concave
(C) Linear
(D) Discrete

Q43. If x and y are random variables with E(x) = 2, E(y) = 3, find E(x + y).
(A) 5
(B) 6
(C) 2
(D) 1

Q44. The function f(x) = x/|x| is not differentiable at:
(A) x = 0
(B) x = 1
(C) x = -1
(D) None

Q45. A cone has volume V = (1/3)πr²h. If r increases at 2 cm/s and h is constant, find dV/dt when r = 3 and h = 6.
(A) 36π
(B) 12π

(C) 18π
(D) 24π

Q46. If A is orthogonal, then A^{-1} =
(A) A
(B) A^T
(C) A^2
(D) |A|

Q47. Evaluate:

$$\int_0^1 1/(1-x^2)^{1/2} \, dx$$

(A) π/2
(B) π
(C) 1
(D) ln 2

Q48. Which of the following is a solution to the differential equation dy/dx = x·y?
(A) y = Ce^(x²/2)
(B) y = x² + C
(C) y = x + C
(D) y = ln(x)

Q49. The number of solutions to the equation |x - 3| = 2x + 1 is:
(A) 0
(B) 1
(C) 2
(D) ∞

Q50. If A and B are two 3x3 matrices such that AB = BA and A is diagonalizable, then:
(A) B is also diagonalizable
(B) AB is symmetric
(C) A and B are simultaneously diagonalizable
(D) B is necessarily symmetric

Q51. A company undertakes a project that returns ₹50,000 every year for 4 years. If the discount rate is 10%, what is the Net Present Value (NPV) of the project (initial investment ₹1,50,000)?
(A) ₹16,920
(B) ₹12,350
(C) ₹8,420
(D) ₹4,200

Q52. The present value of an annuity of ₹5,000 for 3 years at 10% compounded annually is closest to:
(A) ₹12,430
(B) ₹13,590
(C) ₹14,880
(D) ₹15,000

Q53. For a cost function $C(x) = x^3 - 3x^2 + 9x + 5$, the marginal cost at $x = 2$ is:
(A) 5
(B) 7
(C) 11
(D) 13

Q54. If marginal revenue $MR(x) = 30 - 2x$, then total revenue $R(x)$ is:
(A) $30x - x^2 + C$
(B) $15x - 2x^2 + C$
(C) $30x^2 - x + C$
(D) None

Q55. The future value of ₹2,000 invested every year for 5 years at 12% compounded annually is:
(A) ₹12,487
(B) ₹11,898
(C) ₹14,000
(D) ₹10,000

Q56. A customer takes a loan of ₹1,00,000 to be repaid in 5 equal annual installments at 10% interest. What is the EMI?
(A) ₹26,380
(B) ₹25,000

(C) ₹21,370
(D) ₹20,000

Q57. Let A be a 2x2 matrix such that adj(A) = A. Then |A| equals:
(A) ±1
(B) 0
(C) 2
(D) Not defined

Q58. If the correlation coefficient r = -0.85, then the relation between the variables is:
(A) Strong negative
(B) Strong positive
(C) Weak negative
(D) None

Q59. In regression, if the regression line is Y = 5 + 0.6X, the regression coefficient of Y on X is:
(A) 0.6
(B) 5
(C) 1.2
(D) 0

Q60. If the covariance between X and Y is 36 and their standard deviations are 6 and 4 respectively, find correlation coefficient.
(A) 1.5
(B) 0.9
(C) 0.6
(D) 0.25

Q61. The elasticity of demand E = -1. If price increases by 10%, then quantity demanded will:
(A) Decrease by 10%
(B) Increase by 10%
(C) Decrease by 5%
(D) Not change

Q62. A company earns ₹20 per unit. If total cost function is $C(x) = 2x^2 + 10x + 1000$, then profit-maximizing output is:
(A) 3
(B) 5
(C) 2
(D) 4

Q63. If matrix A is such that $A^2 = I$ and $A \neq I$, then the inverse of A is:
(A) A
(B) -A
(C) I
(D) A^T

Q64. What is the value of determinant of $A = [[\cos\theta, -\sin\theta], [\sin\theta, \cos\theta]]$?
(A) 1
(B) 0
(C) -1
(D) $\cos\theta$

Q65. The break-even point occurs when:
(A) Total cost = Total revenue
(B) Marginal cost = Marginal revenue
(C) Profit = 0
(D) Both A and C

Q66. The equation of a line in matrix form AX = B represents:
(A) Linear system
(B) Polynomial function
(C) Determinant
(D) Transformation

Q67. If $C(x) = x^3 - 3x^2 + 2x + 7$, then average cost at x = 2 is:
(A) 4
(B) 3
(C) 5
(D) 6

Q68. If X and Y are uncorrelated, then their covariance is:
(A) 0
(B) 1
(C) -1
(D) Undefined

Q69. The linear demand function is p = a - bq. Marginal revenue is:
(A) a - 2bq
(B) a - bq
(C) a + bq
(D) None

Q70. The rank of matrix A = [[1,2],[2,4]] is:
(A) 1
(B) 0
(C) 2
(D) Infinite

Q71. Time value of money means:
(A) ₹1 today is worth more than ₹1 tomorrow
(B) ₹1 tomorrow is better
(C) Money value is fixed
(D) None

Q72. Which of the following is not a valid constraint in LPP?
(A) $x + y = 5$
(B) $x^2 + y^2 = 4$
(C) $x - y \geq 2$
(D) $x, y \geq 0$

Q73. If net profit is ₹1,20,000 on sales of ₹6,00,000, find profit margin.
(A) 20%
(B) 15%
(C) 25%
(D) 10%

Q74. What is the sum of infinite GP: 200, 100, 50,…?
(A) 400

(B) 600
(C) 200
(D) 800

Q75. Let $f(x) = x / (x^2 + 1)$. The maximum value of f(x) is:
(A) 1/2
(B) 1
(C) $\sqrt{2}$
(D) 2

Q76. The slope of the isoquant curve is called:
(A) MRTS
(B) TR
(C) MR
(D) AVC

Q77. Let A = [[a,b],[c,d]] be a 2x2 matrix. Then adj(A) is:
(A) [[d,-b],[-c,a]]
(B) [[a,-b],[-c,d]]
(C) [[d,c],[b,a]]
(D) None

Q78. If investment is ₹2,00,000 and NPV is ₹30,000, then IRR is:
(A) > discount rate
(B) < discount rate
(C) = discount rate
(D) 0

Q79. In a binomial distribution, mean = np. For n = 10, p = 0.3, find variance.
(A) 2.1
(B) 1.2
(C) 3.0
(D) 4.2

Q80. Regression line of Y on X is Y = 2X + 3. Then change in Y for X = 4 to 6 is:
(A) 4
(B) 2

(C) 6
(D) 3

Q81. The feasible region in LPP is formed by:
(A) Intersection of all constraints
(B) Boundary lines
(C) Axes only
(D) Objective function

Q82. If A is 2x2 matrix and |A| = 4, then |3A| = ?
(A) 36
(B) 12
(C) 16
(D) 18

Q83. If covariance = 0, then:
(A) X and Y are uncorrelated
(B) X and Y are independent
(C) X and Y have equal means
(D) X and Y are negatively correlated

Q84. In AM-GM inequality, equality holds when:
(A) All values are equal
(B) One value is 0
(C) One is double of other
(D) Always

Q85. A cash flow of ₹10,000 received every year for 10 years at 8% has present value:
(A) ₹67,100
(B) ₹66,500
(C) ₹75,000
(D) ₹70,000