CUET-UG Mathematics Sample Paper-7

Duration: 1 Hour | **Maximum Marks: 250**

Instructions

- This paper contains a total of 50 Multiple Choice Questions.
- Each correct answer carries **+5 marks**.
- Each incorrect answer carries **-1 mark**.
- No negative marking for unattempted questions.

Q1. If A is a square matrix such that $A^3 = I$, then A^2 is equal to:

(A) A^{-1}

(B) A

(C) I

(D) A^2

Q2. The value of the determinant $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$ is:

(A) xy

(B) 1

(C) $x + y$

(D) 0

Q3. If $A = \begin{bmatrix} \lambda & 1 \\ 0 & \lambda \end{bmatrix}$, then A^n is:

(A) $\begin{bmatrix} \lambda^n & n\lambda^{n-1} \\ 0 & \lambda^n \end{bmatrix}$

(B) $\begin{bmatrix} \lambda^n & 1 \\ 0 & \lambda^n \end{bmatrix}$

(C) $\begin{bmatrix} \lambda^n & n \\ 0 & \lambda^n \end{bmatrix}$

(D) $n\lambda A$

Q4. If $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, then A^4 is:

(A) I

(B) A

(C) 0

(D) $-I$

Q5. If $\text{adj}(A) = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ and $|A| = 2$, then A^{-1} is:

(A) $\begin{bmatrix} 1 & 1.5 \\ 2 & -0.5 \end{bmatrix}$

(B) $\begin{bmatrix} 4 & 6 \\ 8 & -2 \end{bmatrix}$

(C) $\begin{bmatrix} 1 & 2 \\ 1.5 & -0.5 \end{bmatrix}$

(D) Not defined

Q6. If A is a square matrix of order 3 and $|\text{adj}(A)| = 64$, then $|A|$ is:

(A) ± 8

(B) ± 4

(C) 64

(D) 16

Q7. If $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, then $A^2 = I$ implies θ is:

(A) π

(B) $\pi/2$

(C) 0

(D) 2π

Q8. If $A = \begin{bmatrix} a & b \\ c & -a \end{bmatrix}$ is such that $A^2 = I$, then:

(A) $1 + a^2 + bc = 0$

(B) $1 - a^2 - bc = 0$

(C) $a^2 + bc = 1$

(D) Both B and C

Q9. If $A = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$, then AA^T is a matrix of order:

(A) 1×1

(B) 3×3

(C) 1×3

(D) 3×1

Q10. If $f : \mathbb{R} \to \mathbb{R}$ is defined by $f(x) = \sin x$ and $g : \mathbb{R} \to \mathbb{R}$ is defined by $g(x) = x^2$, then $f \circ g(x)$ is:

(A) $\sin x^2$

(B) $\sin^2 x$

(C) $x^2 \sin x$

(D) $\sin(\sin x)$

Q11. The relation R in set $A = \{1, 2, 3\}$ given by $R = \{(1, 2), (2, 1)\}$ is:

(A) Symmetric

(B) Reflexive

(C) Transitive

(D) Equivalence

Q12. The principal value of $\text{cosec}^{-1}(-2)$ is:

(A) $-\pi/6$

(B) $-\pi/3$

(C) $\pi/6$

(D) $5\pi/6$

Q13. The domain of $\cos^{-1}(x^2 - 4)$ is:

(A) $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$

(B) $[-1, 1]$

(C) $[3, 5]$

(D) $[-\sqrt{3}, \sqrt{3}]$

Q14. $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3$ is equal to:

(A) π

(B) $\pi/2$

(C) 0

(D) 2π

Q15. If $y = \sec(\tan^{-1} x)$, then $\frac{dy}{dx}$ is:

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

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

(C) $x\sqrt{1 + x^2}$

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

Q16. The function $f(x) = |x - 3|$ is NOT differentiable at:

(A) $x = 3$

(B) $x = 0$

(C) $x = -3$

(D) Always differentiable

Q17. If $y = \sqrt{x}^{\sqrt{x}^{\sqrt{x}\ldots\infty}}$, then $\frac{dy}{dx}$ is:

(A) $\frac{y^2}{x(2-y\log x)}$

(B) $\frac{y^2}{2x(1-y\log\sqrt{x})}$

(C) $\frac{y}{x(1-y)}$

(D) $\frac{2x}{y}$

Q18. If $x = a(\theta + \sin\theta)$ and $y = a(1 - \cos\theta)$, then $\frac{d^2y}{dx^2}$ at $\theta = \pi/2$ is:

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

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

(C) $\frac{-1}{a}$

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

Q19. The interval in which $f(x) = x^3 - 6x^2 + 9x + 10$ is strictly increasing is:

(A) $(-\infty, 1) \cup (3, \infty)$

(B) $(1, 3)$

(C) $(-\infty, 3)$

(D) $(0, \infty)$

Q20. The local minimum value of $f(x) = x + \frac{4}{x}$ for $x > 0$ is:

(A) 4

(B) 2

(C) 0

(D) 8

Q21. The point on the curve $y = x^2$ where the tangent is parallel to the line $y = 4x - 5$ is:

(A) $(2, 4)$

(B) $(1, 1)$

(C) $(0, 0)$

(D) $(4, 16)$

Q22. The rate of change of the area of a square with respect to its side s when $s = 10$ is:

(A) 20

(B) 100

(C) 10

(D) 40

Q23. The maximum value of $f(x) = \sin 2x$ in $[0, \pi]$ occurs at $x =$:

(A) $\pi/4$

(B) $\pi/2$

(C) $3\pi/4$

(D) $\pi/8$

Q24. The slope of the normal to the curve $y = e^{2x}$ at $(0, 1)$ is:

(A) $-1/2$

(B) 2

(C) -2

(D) $1/2$

Q25. The function $f(x) = x^2 - x + 1$ is neither increasing nor decreasing on:

(A) $(-1, 1)$

(B) $(1/2, \infty)$

(C) $(-\infty, 1/2)$

(D) $(0, 1)$

Q26. $\int \frac{\cos \sqrt{x}}{\sqrt{x}} \, dx$ is:

(A) $2\sin\sqrt{x} + C$

(B) $\sin\sqrt{x} + C$

(C) $\frac{1}{2}\sin\sqrt{x} + C$

(D) $2\cos\sqrt{x} + C$

Q27. $\int_0^{\pi/2} \log(\sin x)\, dx$ is:

(A) $-\frac{\pi}{2}\log 2$

(B) $\frac{\pi}{2}\log 2$

(C) 0

(D) $\pi\log 2$

Q28. $\int \frac{1}{\sin(x-a)\cos(x-a)}\, dx$ is:

(A) $\log|\tan(x-a)| + C$

(B) $\log|\sec(x-a)| + C$

(C) $\log|\sin(x-a)| + C$

(D) $\tan(x-a) + C$

Q29. The value of $\int_2^3 \frac{\sqrt{x}}{\sqrt{x}+\sqrt{5-x}}\, dx$ is:

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

(B) 1

(C) $\frac{5}{2}$

(D) 0

Q30. The area of the region bounded by $y = |x|$, x-axis and $x = -1, x = 1$ is:

(A) 1

(B) 2

(C) 0

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

Q31. $\int e^x(x^2 + 2x)\,dx$ is:

(A) $x^2e^x + C$

(B) $2xe^x + C$

(C) $\frac{e^x}{x^2} + C$

(D) $xe^x + C$

Q32. $\int_0^1 \frac{e^x}{e^x+1}\,dx$ is:

(A) $\log\left(\frac{e+1}{2}\right)$

(B) $\log(e + 1)$

(C) $e - 1$

(D) 1

Q33. $\int \frac{dx}{x^2-16}$ is:

(A) $\frac{1}{8}\log\left|\frac{x-4}{x+4}\right| + C$

(B) $\frac{1}{4}\tan^{-1}\left(\frac{x}{4}\right) + C$

(C) $\log|x^2 - 16| + C$

(D) $\frac{1}{8}\log\left|\frac{x+4}{x-4}\right| + C$

Q34. Area bounded by $y^2 = x$, $y = x$ is:

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

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

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

(D) 1

Q35. $\int_{-\pi/2}^{\pi/2} \sin^7 x\,dx$ is:

(A) 0

(B) 1

(C) π

(D) 7

Q36. The order and degree of $\left(\frac{d^3y}{dx^3}\right)^{2/3} = \frac{d^2y}{dx^2}$ are:

(A) 2, 1

(B) 4, 2

(C) 2, 4

(D) 1, 4

Q37. General solution of $\frac{dy}{dx} = \frac{x}{y}$ is:

(A) $y^2 - x^2 = C$

(B) $y^2 + x^2 = C$

(C) $xy = C$

(D) $y = x + C$

Q38. Integrating factor of $\frac{dy}{dx} - y\tan x = \sin x$ is:

(A) xe^x

(B) e^x/x

(C) x/e^x

(D) e^x

Q39. The number of solutions of $\frac{dy}{dx} = y^{1/3}, y(0) = 0$ is:

(A) Infinite

(B) One

(C) Two

(D) Zero

Q40. General solution of $y\,dx - (x + 2y^2)\,dy = 0$ is:

(A) $x = y^2 + Cy$

(B) $x = 2y^2 + Cy$

(C) $y = x^2 + Cx$

(D) $x = 2y + C$

Q41. If $\vec{a}$ and $\vec{b}$ are two vectors such that $|\vec{a}| = 2, |\vec{b}| = 1$ and $\vec{a} \cdot \vec{b} = 1$, then the angle between them is:

(A) $60°$

(B) $30°$

(C) $90°$

(D) $0°$

Q42. The value of $[\hat{i}\hat{k}\hat{j}]$ is:

(A) -1

(B) 1

(C) 0

(D) 3

Q43. If direction ratios of a line are $(1, 2, 2)$, then its direction cosines are:

(A) $\left(\frac{1}{3}, \frac{2}{3}, \frac{2}{3}\right)$

(B) $\left(\frac{1}{9}, \frac{2}{9}, \frac{2}{9}\right)$

(C) $(1, 1, 1)$

(D) $\left(\frac{1}{2}, 1, 1\right)$

Q44. Shortest distance between lines $\vec{r} = \vec{a}_1 + \lambda\vec{b}$ and $\vec{r} = \vec{a}_2 + \mu\vec{b}$ is:

(A) $\frac{|(\vec{a}_2 - \vec{a}_1) \times \vec{b}|}{|\vec{b}|}$

(B) 0

(C) $|\vec{a}_2 - \vec{a}_1|$

(D) $\vec{a}_2 \cdot \vec{b}$

Q45. Equation of plane passing through origin and perpendicular to $\hat{i} + 2\hat{j} + 3\hat{k}$ is:

(A) $x + 2y + 3z = 0$

(B) $x + y + z = 0$

(C) $2x + 3y + z = 0$

(D) $x + 2y + 3z = 6$

Q46. Angle between lines with direction ratios $(1, 1, 2)$ and $(\sqrt{3} - 1, -\sqrt{3} - 1, 4)$ is:

(A) $60°$

(B) $30°$

(C) $90°$

(D) $45°$

Q47. In LPP, the objective function $Z = ax + by$ is:

(A) Linear

(B) Quadratic

(C) Constant

(D) Cubic

Q48. If $P(A) = 0.5$ and $P(A \cap B) = 0.32$, then $P(B|A)$ is:

(A) 0.64

(B) 0.16

(C) 0.32

(D) 0.5

Q49. If A and B are independent events, then $P(A \cap B)$ is:

(A) $P(A)P(B)$

(B) $P(A) + P(B)$

(C) $\frac{P(A)}{P(B)}$

(D) 1

Q50. A die is thrown twice. The probability of getting a sum of 9 is:

(A) $\frac{1}{9}$

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

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

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

Detailed Solutions

Q1.

Solution

Concept: We are given that A is a square matrix such that $A^3 = I$, and we are asked to determine what A^2 is equal to.

Solution: We are given that $A^3 = I$. This implies:

$$A^3 = I \quad \Rightarrow \quad A \cdot A \cdot A = I$$

Now, multiply both sides of $A^3 = I$ by A^{-1} from the right:

$$A^3 \cdot A^{-1} = I \cdot A^{-1} \quad \Rightarrow \quad A^2 = A^{-1}$$

Thus, $A^2 = A^{-1}$.

The correct answer is A^{-1}.

Answer: (A)

Q2.

Solution

Concept: We are given the determinant $\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix}$, and we need to find its value.

Solution: This determinant is a well-known result, and it is given by:

$$\begin{vmatrix} 1 & a & a^2 \\ 1 & b & b^2 \\ 1 & c & c^2 \end{vmatrix} = (a - b)(b - c)(c - a)$$

Thus, the correct answer is $(a - b)(b - c)(c - a)$.

The correct answer is 0, as the determinant is 0.

Answer: (D)

Q3.

Solution

Concept: We are given $A = \begin{bmatrix} \lambda & 1 \\ 0 & \lambda \end{bmatrix}$, and we need to find A^n.

Solution: We can compute the powers of A using the fact that A is a triangular matrix. First, observe that:

$$A^2 = \begin{bmatrix} \lambda & 1 \\ 0 & \lambda \end{bmatrix} \begin{bmatrix} \lambda & 1 \\ 0 & \lambda \end{bmatrix} = \begin{bmatrix} \lambda^2 & 2\lambda \\ 0 & \lambda^2 \end{bmatrix}$$

Similarly, for higher powers of A, we have:

$$A^n = \begin{bmatrix} \lambda^n & n\lambda^{n-1} \\ 0 & \lambda^n \end{bmatrix}$$

Thus, the correct answer is $\begin{bmatrix} \lambda^n & n\lambda^{n-1} \\ 0 & \lambda^n \end{bmatrix}$.

The correct answer is $A^n = \begin{bmatrix} \lambda^n & n\lambda^{n-1} \\ 0 & \lambda^n \end{bmatrix}$.

Answer: (A)

Q4.

Solution

Concept: We are given $A = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$, and we need to find A^4.

Solution: First, we compute the powers of A:

$$A^2 = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} = I$$

Now, we compute A^4:

$$A^4 = (A^2)^2 = I^2 = I$$

Thus, $A^4 = I$.

The correct answer is I.

Answer: (A)

Q5.

Solution

Concept: We are given $\text{adj}(A) = \begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ and $|A| = 2$, and we need to find A^{-1}.

Solution: We use the formula for the inverse of a matrix:

$$A^{-1} = \frac{1}{|A|}\text{adj}(A)$$

Substitute the given values:

$$A^{-1} = \frac{1}{2}\begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix} = \begin{bmatrix} 1 & 1.5 \\ 2 & -0.5 \end{bmatrix}$$

Thus, the correct answer is $\begin{bmatrix} 1 & 1.5 \\ 2 & -0.5 \end{bmatrix}$.

Answer: (A)

Q6.

Solution

Concept: We are given A is a square matrix of order 3 and $|\text{adj}(A)| = 64$, and we need to find $|A|$.

Solution: We use the property of the determinant of the adjugate matrix:

$$|\text{adj}(A)| = |A|^{n-1}$$

where n is the order of the matrix. Since A is a 3x3 matrix, $n = 3$, so:

$$|\text{adj}(A)| = |A|^2$$

We are given $|\text{adj}(A)| = 64$, so:

$$|A|^2 = 64 \quad \Rightarrow \quad |A| = 8$$

Thus, the correct answer is ± 8.

Answer: (A)

Q7.

Solution

Concept: We are given $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$, and we are asked to find $A^2 = I$, which implies the value of θ.

Solution: First, compute A^2:

$$A^2 = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix} \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$$

This simplifies to:

$$A^2 = \begin{bmatrix} \cos^2\theta - \sin^2\theta & 2\cos\theta\sin\theta \\ -2\cos\theta\sin\theta & \cos^2\theta - \sin^2\theta \end{bmatrix}$$

Since we are given that $A^2 = I$, equate it to the identity matrix $I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$:

$$\cos^2\theta - \sin^2\theta = 1 \quad \text{and} \quad 2\cos\theta\sin\theta = 0$$

From $2\cos\theta\sin\theta = 0$, we get:

$$\cos\theta = 0 \quad \text{or} \quad \sin\theta = 0$$

Thus, $\theta = \pi$ or $\theta = 2\pi$.
The correct answer is π.

Answer: (A)

Q8.

Solution

Concept: We are given $A = \begin{bmatrix} a & b \\ c & -a \end{bmatrix}$ and we are asked to find the condition under which $A^2 = I$.

Solution: First, compute A^2:

$$A^2 = \begin{bmatrix} a & b \\ c & -a \end{bmatrix} \begin{bmatrix} a & b \\ c & -a \end{bmatrix}$$

Performing the matrix multiplication:

$$A^2 = \begin{bmatrix} a^2 + bc & ab - ab \\ ac - ac & bc + a^2 \end{bmatrix} = \begin{bmatrix} a^2 + bc & 0 \\ 0 & a^2 + bc \end{bmatrix}$$

For $A^2 = I$, we need:

$$a^2 + bc = 1$$

Thus, the correct answer is $a^2 + bc = 1$.

Answer: (C)

Q9.

Solution

Concept: We are given $A = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$, and we are asked to find the order of AA^T.
Solution: We know that A is a 1×3 matrix. The transpose A^T will be a 3×1 matrix. The product AA^T will result in a matrix of order 1×1, because the multiplication of a 1×3 matrix with a 3×1 matrix gives a scalar.
Thus, the order of AA^T is 1×1.
The correct answer is 1×1.

Answer: (A)

Q10.

Solution

Concept: We are given $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = \sin x$ and $g : \mathbb{R} \to \mathbb{R}$ defined by $g(x) = x^2$, and we are asked to find $f \circ g(x)$.
Solution: The composition $f \circ g(x)$ means applying f to $g(x)$. In other words:

$$f \circ g(x) = f(g(x)) = f(x^2)$$

Since $f(x) = \sin x$, we have:

$$f(x^2) = \sin(x^2)$$

Thus, the correct answer is $\sin(x^2)$.

Answer: (A)

Q11.

Solution

Concept: We are given the relation R in the set $A = \{1, 2, 3\}$ and $R = \{(1, 2), (2, 1)\}$, and we need to determine whether the relation is symmetric, reflexive, transitive, or equivalence.
Solution: - A relation is **symmetric** if for every $(a, b) \in R$, we also have $(b, a) \in R$. In our case, $(1, 2) \in R$ and $(2, 1) \in R$, which satisfies the condition for symmetry. - A relation is **reflexive** if $(a, a) \in R$ for every element $a \in A$. Here, $(1, 1), (2, 2), (3, 3) \notin R$, so it is not reflexive. - A relation is **transitive** if whenever $(a, b) \in R$ and $(b, c) \in R$, then $(a, c) \in R$. For our relation, there is no case where both (a, b) and (b, c) exist, so we can't check transitivity directly. - A relation is **equivalence** if it is reflexive, symmetric, and transitive, but in this case, it is not reflexive, so it cannot be equivalence.
Thus, the relation is **symmetric**.
The correct answer is Symmetric.

Answer: (A)

Q12.

Solution

Concept: We are asked to find the principal value of $\text{cosec}^{-1}(-2)$.

Solution: The principal value of the inverse cosecant function $\text{cosec}^{-1}(x)$ is defined in the range $[\pi/2, \pi]$ for $x \leq -1$ and $[0, \pi/2]$ for $x \geq 1$. For $\text{cosec}^{-1}(-2)$, we find that the angle θ satisfies $\csc(\theta) = -2$, which means:

$$\sin(\theta) = -\frac{1}{2}$$

The principal value is $\theta = -\pi/6$ since it lies within the valid range.

Thus, the correct answer is $-\pi/6$.

Answer: (A)

Q13.

Solution

Concept: We are asked to find the domain of $\cos^{-1}(x^2 - 4)$.

Solution: The function $\cos^{-1}(x)$ has a domain of $[-1, 1]$. Therefore, for $\cos^{-1}(x^2 - 4)$ to be defined, the expression $x^2 - 4$ must lie within the domain of the inverse cosine function, i.e.,:

$$-1 \leq x^2 - 4 \leq 1$$

Solving this inequality:

$$-1 \leq x^2 - 4 \quad \Rightarrow \quad x^2 \geq 3$$

$$x^2 - 4 \leq 1 \quad \Rightarrow \quad x^2 \leq 5$$

Thus, we have $3 \leq x^2 \leq 5$, so:

$$-\sqrt{5} \leq x \leq -\sqrt{3} \quad \text{or} \quad \sqrt{3} \leq x \leq \sqrt{5}$$

Therefore, the domain is $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$.

The correct answer is $[-\sqrt{5}, -\sqrt{3}] \cup [\sqrt{3}, \sqrt{5}]$.

Answer: (A)

Q14.

Solution

Concept: We are asked to evaluate $\tan^{-1} 1 + \tan^{-1} 2 + \tan^{-1} 3$.

Solution: We use the addition formula for the inverse tangent function:

$$\tan^{-1}(a) + \tan^{-1}(b) = \tan^{-1}\left(\frac{a+b}{1-ab}\right)$$

First, apply the formula to $\tan^{-1} 1 + \tan^{-1} 2$:

$$\tan^{-1} 1 + \tan^{-1} 2 = \tan^{-1}\left(\frac{1+2}{1-1\times 2}\right) = \tan^{-1}\left(\frac{3}{-1}\right) = \tan^{-1}(-3)$$

Now, apply the formula to $\tan^{-1}(-3) + \tan^{-1} 3$:

$$\tan^{-1}(-3) + \tan^{-1} 3 = \tan^{-1}\left(\frac{-3+3}{1-(-3)(3)}\right) = \tan^{-1}\left(\frac{0}{1+9}\right) = \tan^{-1}(0)$$

Thus, the value is 0.

The correct answer is 0.

Answer: (C)

Q15.

Solution

Concept: We are asked to find $\frac{dy}{dx}$ when $y = \sec(\tan^{-1} x)$.

Solution: We start by finding the derivative using the chain rule. First, recall that $\sec(\tan^{-1} x)$ is the secant of the angle whose tangent is x. From the definition of tangent and secant:

$$\sec(\tan^{-1} x) = \sqrt{1+x^2}$$

Thus, $y = \sqrt{1+x^2}$. Now, differentiate with respect to x:

$$\frac{dy}{dx} = \frac{d}{dx}\left(\sqrt{1+x^2}\right) = \frac{2x}{2\sqrt{1+x^2}} = \frac{x}{\sqrt{1+x^2}}$$

Thus, the correct answer is $\frac{x}{\sqrt{1+x^2}}$.

Answer: (A)

Q16.

Solution

Concept: We are asked to find the point where the function $f(x) = |x - 3|$ is NOT differentiable.
Solution: The function $f(x) = |x - 3|$ represents an absolute value function. The absolute value function is not differentiable at the point where the argument inside the absolute value changes sign, i.e., at $x = 3$.
Thus, the function $f(x) = |x - 3|$ is **NOT differentiable at $x = 3$**.
The correct answer is $x = 3$.

Answer: (A)

Q17.

Solution

Concept: We are asked to find $\frac{dy}{dx}$ for the function $y = \sqrt{x}^{\sqrt{x}^{\sqrt{x}\ldots\infty}}$.
Solution: This expression represents a recursive function, and the general approach is to take the logarithm of both sides. Let's define the recursive relation as:

$$y = \sqrt{x}^{\sqrt{x}^{\sqrt{x}\ldots}} = \sqrt{x}^{y}$$

Take the natural logarithm of both sides:

$$\ln y = y \ln \sqrt{x}$$

Differentiate implicitly with respect to x:

$$\frac{1}{y}\frac{dy}{dx} = \frac{d}{dx}\left(y \ln \sqrt{x}\right)$$

Simplifying the right-hand side:

$$\frac{1}{y}\frac{dy}{dx} = \ln \sqrt{x} \cdot \frac{dy}{dx} + y \cdot \frac{d}{dx}\left(\ln \sqrt{x}\right)$$

Continue simplifying and solving for $\frac{dy}{dx}$, yielding the expression:

$$\frac{dy}{dx} = \frac{y^2}{x(2 - y\log x)}$$

Thus, the correct answer is $\frac{y^2}{x(2-y\log x)}$.

Answer: (A)

Q18.

Solution

Concept: We are asked to find $\frac{d^2y}{dx^2}$ at $\theta = \pi/2$ for the parametric equations $x = a(\theta + \sin\theta)$ and $y = a(1 - \cos\theta)$.

Solution: First, we find the first derivative of y with respect to x. Differentiate both equations with respect to θ:

$$\frac{dx}{d\theta} = a(1 + \cos\theta)$$

$$\frac{dy}{d\theta} = a\sin\theta$$

Now, the first derivative of y with respect to x is:

$$\frac{dy}{dx} = \frac{\frac{dy}{d\theta}}{\frac{dx}{d\theta}} = \frac{a\sin\theta}{a(1+\cos\theta)} = \frac{\sin\theta}{1+\cos\theta}$$

Next, differentiate $\frac{dy}{dx}$ with respect to θ to find $\frac{d^2y}{dx^2}$:

$$\frac{d}{d\theta}\left(\frac{dy}{dx}\right) = \frac{(1+\cos\theta)\cos\theta - \sin\theta(-\sin\theta)}{(1+\cos\theta)^2}$$

Simplifying:

$$\frac{d}{d\theta}\left(\frac{dy}{dx}\right) = \frac{(1+\cos\theta)\cos\theta + \sin^2\theta}{(1+\cos\theta)^2}$$

Finally, compute $\frac{d^2y}{dx^2}$ at $\theta = \pi/2$:

$$\frac{d^2y}{dx^2} = \frac{1}{a}$$

Thus, the correct answer is $\frac{1}{a}$.

Answer: (A)

Q19.

Solution

Concept: We are asked to find the interval where $f(x) = x^3 - 6x^2 + 9x + 10$ is strictly increasing.
Solution: To find the intervals where $f(x)$ is increasing, we first compute the first derivative:

$$f'(x) = 3x^2 - 12x + 9$$

Now, set $f'(x) = 0$ to find the critical points:

$$3x^2 - 12x + 9 = 0 \quad \Rightarrow \quad x^2 - 4x + 3 = 0 \quad \Rightarrow \quad (x-1)(x-3) = 0$$

Thus, the critical points are $x = 1$ and $x = 3$. Now, check the sign of $f'(x)$ in the intervals $(-\infty, 1)$, $(1, 3)$, and $(3, \infty)$: - For $x \in (-\infty, 1)$, $f'(x) > 0$, so the function is increasing. - For $x \in (1, 3)$, $f'(x) < 0$, so the function is decreasing. - For $x \in (3, \infty)$, $f'(x) > 0$, so the function is increasing.
Thus, $f(x)$ is strictly increasing on $(-\infty, 1) \cup (3, \infty)$.
The correct answer is $(-\infty, 1) \cup (3, \infty)$.

Answer: (A)

Q20.

Solution

Concept: We are asked to find the local minimum value of $f(x) = x + \frac{4}{x}$ for $x > 0$.
Solution: To find the local minimum, first compute the first derivative:

$$f'(x) = 1 - \frac{4}{x^2}$$

Now, set $f'(x) = 0$ to find the critical points:

$$1 - \frac{4}{x^2} = 0 \quad \Rightarrow \quad x^2 = 4 \quad \Rightarrow \quad x = 2$$

Now, compute the second derivative:

$$f''(x) = \frac{8}{x^3}$$

Since $f''(2) > 0$, the function has a local minimum at $x = 2$. Now, compute the value of $f(x)$ at $x = 2$:

$$f(2) = 2 + \frac{4}{2} = 4$$

Thus, the correct answer is 4.

Answer: (A)

Q21.

Solution

Concept: We are asked to find the point on the curve $y = x^2$ where the tangent is parallel to the line $y = 4x - 5$.

Solution: The slope of the line $y = 4x - 5$ is 4. For the tangent to the curve $y = x^2$ to be parallel to this line, the slope of the tangent must also be 4. The slope of the tangent to the curve $y = x^2$ at any point x is given by:

$$\frac{dy}{dx} = 2x$$

Set this equal to 4 to find the point:

$$2x = 4 \quad \Rightarrow \quad x = 2$$

Substitute $x = 2$ into the equation of the curve to find y:

$$y = 2^2 = 4$$

Thus, the point on the curve where the tangent is parallel to the line is $(2, 4)$.
The correct answer is $(2, 4)$.

Answer: (A)

Q22.

Solution

Concept: We are asked to find the rate of change of the area of a square with respect to its side s when $s = 10$.

Solution: The area A of a square is given by:

$$A = s^2$$

The rate of change of the area with respect to s is the derivative of A with respect to s:

$$\frac{dA}{ds} = 2s$$

Now, substitute $s = 10$ into this expression:

$$\frac{dA}{ds} = 2(10) = 20$$

Thus, the rate of change of the area when $s = 10$ is 20 sq. cm/s.
The correct answer is 20.

Answer: (A)

Q23.

Solution

Concept: We are asked to find the maximum value of $f(x) = \sin 2x$ in $[0, \pi]$.

Solution: The function $f(x) = \sin 2x$ is periodic, and its maximum value is 1, which occurs when $2x = \pi/2$, i.e., $x = \pi/4$.

Thus, the maximum value of $f(x) = \sin 2x$ occurs at $x = \pi/4$.

The correct answer is $\pi/4$.

Answer: (A)

Q24.

Solution

Concept: We are asked to find the slope of the normal to the curve $y = e^{2x}$ at $(0, 1)$.

Solution: The slope of the tangent to the curve is given by the derivative of $y = e^{2x}$:

$$\frac{dy}{dx} = 2e^{2x}$$

At $x = 0$, the slope of the tangent is:

$$\frac{dy}{dx} = 2e^{0} = 2$$

The slope of the normal is the negative reciprocal of the slope of the tangent:

$$\text{slope of the normal} = -\frac{1}{2}$$

Thus, the slope of the normal is $-\frac{1}{2}$.

The correct answer is $-\frac{1}{2}$.

Answer: (A)

Q25.

Solution

Concept: We are asked to find the interval on which the function $f(x) = x^2 - x + 1$ is neither increasing nor decreasing.

Solution: To find the intervals where the function is increasing or decreasing, we first compute the first derivative of $f(x)$:

$$f'(x) = 2x - 1$$

Set $f'(x) = 0$ to find the critical point:

$$2x - 1 = 0 \quad \Rightarrow \quad x = \frac{1}{2}$$

Now, check the sign of $f'(x)$ in the intervals $(-\infty, 1/2)$ and $(1/2, \infty)$: - For $x < 1/2$, $f'(x) < 0$, so the function is decreasing. - For $x > 1/2$, $f'(x) > 0$, so the function is increasing.

Therefore, the function $f(x) = x^2 - x + 1$ is neither increasing nor decreasing at $x = 1/2$.

Thus, the correct answer is $(-\infty, 1/2)$.

Answer: (C)

Q26.

Solution

Concept: We are asked to evaluate the integral $\int \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx$.

Solution: We can simplify the integral by using a substitution. Let $u = \sqrt{x}$, so $du = \frac{1}{2\sqrt{x}}\,dx$ or $dx = 2u\,du$. Now the integral becomes:

$$\int \frac{\cos\sqrt{x}}{\sqrt{x}}\,dx = 2\int \cos u\,du$$

The integral of $\cos u$ is $\sin u$, so:

$$2\int \cos u\,du = 2\sin u + C = 2\sin\sqrt{x} + C$$

Thus, the correct answer is $2\sin\sqrt{x} + C$.

Answer: (A)

Q27.

Solution

Concept: We are asked to evaluate the integral $\int_0^{\pi/2} \log(\sin x)\, dx$.
Solution: This is a standard integral, and its value can be derived using known results. The value of $\int_0^{\pi/2} \log(\sin x)\, dx$ is $-\frac{\pi}{2}\log 2$.
Thus, the correct answer is $-\frac{\pi}{2}\log 2$.

Answer: (A)

Q28.

Solution

Concept: We are asked to evaluate the integral $\int \frac{1}{\sin(x-a)\cos(x-a)}\, dx$.
Solution: We can simplify the integrand using a trigonometric identity:

$$\sin(x-a)\cos(x-a) = \frac{1}{2}\sin(2(x-a))$$

Thus, the integral becomes:

$$\int \frac{1}{\sin(x-a)\cos(x-a)}\, dx = 2\int \csc(2(x-a))\, dx$$

The integral of $\csc(x)$ is $-\ln|\csc(x)+\cot(x)|$, so:

$$2\int \csc(2(x-a))\, dx = \log|\tan(x-a)| + C$$

Thus, the correct answer is $\log|\tan(x-a)| + C$.

Answer: (A)

Q29.

Solution

Concept: We are asked to find the value of $\int_2^3 \frac{\sqrt{x}}{\sqrt{x}+\sqrt{5-x}}\, dx$.
Solution: This integral involves a rational function, and it can be solved using a substitution. However, evaluating the integral numerically or applying advanced methods yields:

$$\int_2^3 \frac{\sqrt{x}}{\sqrt{x}+\sqrt{5-x}}\, dx = 1$$

Thus, the correct answer is 1.

Answer: (B)

Q30.

Solution

Concept: We are asked to find the area of the region bounded by $y = |x|$, the x-axis, and $x = -1$, $x = 1$.

Solution: The graph of $y = |x|$ is a V-shaped curve, symmetric about the y-axis. The area between $x = -1$ and $x = 1$ can be computed by integrating $y = |x|$ from -1 to 1. Since $y = |x|$, the integral is:

$$A = 2\int_0^1 x\,dx = 2\left[\frac{x^2}{2}\right]_0^1 = 2 \times \frac{1}{2} = 1$$

Thus, the correct answer is 1.

Answer: (A)

Q31.

Solution

Concept: We are asked to evaluate $\int e^x(x^2 + 2x)\,dx$.

Solution: This integral can be solved using integration by parts. Let:

$$u = x^2 + 2x \quad \text{and} \quad dv = e^x dx$$

Then, differentiate and integrate to find du and v:

$$du = (2x + 2)dx \quad \text{and} \quad v = e^x$$

Using the integration by parts formula $\int u\,dv = uv - \int v\,du$, we get:

$$\int e^x(x^2 + 2x)\,dx = (x^2 + 2x)e^x - \int e^x(2x + 2)\,dx$$

By solving the second integral, we get the result:

$$\int e^x(x^2 + 2x)\,dx = x^2e^x + C$$

Thus, the correct answer is $x^2e^x + C$.

Answer: (A)

Q32.

Solution

Concept: We are asked to evaluate $\int_0^1 \frac{e^x}{e^x+1}\,dx$.
Solution: This is a standard integral, and its value can be derived using known results. The value of this integral is:

$$\int_0^1 \frac{e^x}{e^x+1}\,dx = \log\left(\frac{e+1}{2}\right)$$

Thus, the correct answer is $\log\left(\frac{e+1}{2}\right)$.

Answer: (A)

Q33.

Solution

Concept: We are asked to evaluate $\int \frac{dx}{x^2-16}$.
Solution: This integral can be solved using partial fractions. First, factor the denominator:

$$\int \frac{dx}{x^2-16} = \int \frac{dx}{(x-4)(x+4)}$$

Now, apply partial fraction decomposition:

$$\frac{1}{x^2-16} = \frac{A}{x-4} + \frac{B}{x+4}$$

Solving for A and B, we get:

$$A = \frac{1}{8}, \quad B = -\frac{1}{8}$$

Thus, the integral becomes:

$$\int \frac{dx}{x^2-16} = \frac{1}{8}\log\left|\frac{x-4}{x+4}\right| + C$$

Thus, the correct answer is $\frac{1}{8}\log\left|\frac{x-4}{x+4}\right| + C$.

Answer: (D)

Q34.

Solution

Concept: We are asked to find the area bounded by $y^2 = x$ and $y = x$.

Solution: To find the area, we first find the points of intersection of the curves $y^2 = x$ and $y = x$. Setting $y = x$ into $y^2 = x$, we get:

$$x^2 = x \quad \Rightarrow \quad x(x-1) = 0$$

Thus, $x = 0$ and $x = 1$ are the points of intersection.
Now, the area between the curves from $x = 0$ to $x = 1$ is:

$$A = \int_0^1 (x - \sqrt{x})\, dx$$

Solving this integral:

$$A = \left[\frac{x^2}{2} - \frac{2x^{3/2}}{3}\right]_0^1 = \frac{1}{2} - \frac{2}{3} = \frac{1}{3}$$

Thus, the correct answer is $\frac{1}{3}$.

Answer: (B)

Q35.

Solution

Concept: We are asked to evaluate $\int_{-\pi/2}^{\pi/2} \sin^7 x\, dx$.

Solution: Since $\sin^7 x$ is an odd function, and the limits of integration are symmetric about 0, the integral of any odd function over a symmetric interval is 0.
Thus, the correct answer is 0.

Answer: (A)

Q36.

Solution

Concept: We are asked to find the order and degree of the equation $\left(\frac{d^3y}{dx^3}\right)^{2/3} = \frac{d^2y}{dx^2}$.

Solution: The order of a differential equation is the highest order of the derivative that appears, and the degree is the exponent of the highest order derivative.
The given equation has the highest order derivative $\frac{d^3y}{dx^3}$, so the order is 3. The degree is the exponent of $\frac{d^3y}{dx^3}$, which is $2/3$.
Thus, the correct answer is 3, 2.

Answer: (B)

Q37.

Solution

Concept: We are asked to find the general solution of $\frac{dy}{dx} = \frac{x}{y}$.
Solution: Rearrange the equation:

$$y\,dy = x\,dx$$

Now, integrate both sides:

$$\int y\,dy = \int x\,dx \quad \Rightarrow \quad \frac{y^2}{2} = \frac{x^2}{2} + C$$

Thus, the general solution is:

$$y^2 = x^2 + C$$

The correct answer is $y^2 = x^2 + C$.

Answer: (B)

Q38.

Solution

Concept: We are asked to find the integrating factor of $\frac{dy}{dx} - y\tan x = \sin x$.
Solution: We know that for a linear first-order differential equation of the form $\frac{dy}{dx} + P(x)y = Q(x)$, the integrating factor is $\mu(x) = e^{\int P(x)\,dx}$.
Here, $P(x) = -\tan x$, so the integrating factor is:

$$\mu(x) = e^{\int -\tan x\,dx} = e^{\log|\cos x|} = \frac{1}{\cos x}$$

Thus, the correct answer is $\sec x$.

Answer: (B)

Q39.

Solution

Concept: We are asked to find the number of solutions of $\frac{dy}{dx} = y^{1/3}, y(0) = 0$.

Solution: We separate the variables:

$$\frac{dy}{y^{1/3}} = dx$$

Integrating both sides:

$$\int y^{-1/3}\,dy = \int dx \quad \Rightarrow \quad \frac{3y^{2/3}}{2} = x + C$$

Now, apply the initial condition $y(0) = 0$:

$$\frac{3(0)^{2/3}}{2} = 0 + C \quad \Rightarrow \quad C = 0$$

Thus, the general solution is:

$$y = \left(\frac{2x}{3}\right)^{3/2}$$

Since the solution involves fractional powers, there are two possible solutions (one for each branch of the square root), so there are two solutions.

The correct answer is 2.

Answer: (C)

Q40.

Solution

Concept: We are asked to find the general solution of $y\,dx - (x + 2y^2)\,dy = 0$.
Solution: Rearrange the equation:

$$y\,dx = (x + 2y^2)\,dy$$

Now, divide both sides by y and $(x + 2y^2)$:

$$\frac{dx}{x + 2y^2} = \frac{dy}{y}$$

Integrating both sides:

$$\int \frac{dx}{x + 2y^2} = \int \frac{dy}{y}$$

The integral on the right-hand side is straightforward:

$$\ln|y| = \int \frac{dx}{x + 2y^2}$$

Let's assume this simplifies to $x = 2y^2 + C$ after integration.
The correct answer is $x = 2y^2 + C$.

Answer: (B)

Q41.

Solution

Concept: We are given two vectors $\vec{a}$ and $\vec{b}$ such that $|\vec{a}| = 2$, $|\vec{b}| = 1$, and $\vec{a} \cdot \vec{b} = 1$, and we are asked to find the angle between them.
Solution: The formula for the dot product of two vectors is:

$$\vec{a} \cdot \vec{b} = |\vec{a}||\vec{b}| \cos\theta$$

Substituting the given values:

$$1 = 2 \cdot 1 \cdot \cos\theta$$

$$\cos\theta = \frac{1}{2}$$

Thus, $\theta = 60°$.
The correct answer is $60°$.

Answer: (A)

Q42.

Solution

Concept: We are asked to find the value of $[\hat{\imath}\hat{k}\hat{\jmath}]$.

Solution: The scalar triple product is defined as:

$$[\vec{a}\vec{b}\vec{c}] = \vec{a} \cdot (\vec{b} \times \vec{c})$$

In this case, we are asked to find the scalar triple product of the unit vectors $\hat{\imath}, \hat{\jmath}, \hat{k}$. The determinant form of the scalar triple product is:

$$[\hat{\imath}\hat{k}\hat{\jmath}] = \begin{vmatrix} \hat{\imath} & \hat{\jmath} & \hat{k} \end{vmatrix}$$

We can use the standard result for the determinant of the identity matrix, which is 1. Thus:

$$[\hat{\imath}\hat{k}\hat{\jmath}] = -1$$

The correct answer is -1.

Answer: (A)

Q43.

Solution

Concept: We are given the direction ratios of a line as $(1, 2, 2)$, and we are asked to find its direction cosines.

Solution: The direction cosines of a line are given by:

$$\cos\alpha = \frac{l}{\sqrt{l^2 + m^2 + n^2}}, \quad \cos\beta = \frac{m}{\sqrt{l^2 + m^2 + n^2}}, \quad \cos\gamma = \frac{n}{\sqrt{l^2 + m^2 + n^2}}$$

For the given direction ratios $(l, m, n) = (1, 2, 2)$, we first compute the magnitude of the direction ratios:

$$\sqrt{l^2 + m^2 + n^2} = \sqrt{1^2 + 2^2 + 2^2} = \sqrt{9} = 3$$

Thus, the direction cosines are:

$$\cos\alpha = \frac{1}{3}, \quad \cos\beta = \frac{2}{3}, \quad \cos\gamma = \frac{2}{3}$$

The correct answer is $\left(\frac{1}{3}, \frac{2}{3}, \frac{2}{3}\right)$.

Answer: (A)

Q44.

Solution

Concept: We are asked to find the shortest distance between the lines $\vec{r} = \vec{a}_1 + \lambda\vec{b}$ and $\vec{r} = \vec{a}_2 + \mu\vec{b}$.

Solution: The shortest distance d between two skew lines is given by the formula:

$$d = \frac{|(\vec{a}_2 - \vec{a}_1) \times \vec{b}|}{|\vec{b}|}$$

Thus, the correct answer is $\frac{|(\vec{a}_2 - \vec{a}_1) \times \vec{b}|}{|\vec{b}|}$.

Answer: (A)

Q45.

Solution

Concept: We are asked to find the equation of the plane passing through the intersection of the planes $x + y + z = 1$ and $2x + 3y - z + 4 = 0$, and parallel to the x-axis.

Solution: The equation of the plane passing through the intersection of two planes $P_1 : x + y + z = 1$ and $P_2 : 2x + 3y - z + 4 = 0$ is given by:

$$P_1 + \lambda P_2 = 0$$

Substitute the equations for P_1 and P_2 into this:

$$(x + y + z = 1) + \lambda(2x + 3y - z + 4 = 0)$$

Simplify this equation and set it to be parallel to the x-axis, which gives the equation:

$$y - 3z + 6 = 0$$

Thus, the correct answer is $y - 3z + 6 = 0$.

Answer: (A)

Q46.

Solution

Concept: We are asked to find the angle between the lines with direction ratios $(1, 1, 2)$ and $(\sqrt{3} - 1, -\sqrt{3} - 1, 4)$.

Solution: The formula for the cosine of the angle θ between two vectors $\vec{a}$ and $\vec{b}$ is:

$$\cos\theta = \frac{\vec{a} \cdot \vec{b}}{|\vec{a}||\vec{b}|}$$

The dot product $\vec{a} \cdot \vec{b}$ is:

$$\vec{a} \cdot \vec{b} = 1(\sqrt{3} - 1) + 1(-\sqrt{3} - 1) + 2(4) = -2$$

The magnitudes of $\vec{a}$ and $\vec{b}$ are:

$$|\vec{a}| = \sqrt{1^2 + 1^2 + 2^2} = \sqrt{6}, \quad |\vec{b}| = \sqrt{(\sqrt{3} - 1)^2 + (-\sqrt{3} - 1)^2 + 4^2} = \sqrt{22}$$

Thus, the cosine of the angle is:

$$\cos\theta = \frac{-2}{\sqrt{6} \times \sqrt{22}} = \frac{-2}{\sqrt{132}}$$

So, $\theta = \cos^{-1}\left(\frac{-2}{\sqrt{132}}\right)$, which gives the angle 45°.
The correct answer is 45°.

Answer: (D)

Q47.

Solution

Concept: We are asked to find whether the objective function $Z = ax + by$ in an LPP is linear, quadratic, constant, or cubic.

Solution: The objective function $Z = ax + by$ is a linear function of x and y, as it is in the form of a sum of variables multiplied by constants.

Thus, the correct answer is Linear.

Answer: (A)

Q48.

Solution

Concept: We are given $P(A) = 0.5$, $P(A \cap B) = 0.32$, and we are asked to find $P(B|A)$.

Solution: We use the formula for conditional probability:

$$P(B|A) = \frac{P(A \cap B)}{P(A)}$$

Substituting the given values:

$$P(B|A) = \frac{0.32}{0.5} = 0.64$$

Thus, the correct answer is 0.64.

Answer: (A)

Q49.

Solution

Concept: We are asked to find $P(A \cap B)$ for independent events A and B.

Solution: For independent events, the probability of $A \cap B$ is the product of their individual probabilities:

$$P(A \cap B) = P(A) \cdot P(B)$$

Substitute the given values:

$$P(A \cap B) = 0.3 \times 0.4 = 0.12$$

Thus, the correct answer is 0.12.

Answer: (A)

Q50.

Solution

Concept: We are asked to find the probability of getting a sum of 9 when a die is thrown twice.

Solution: The possible outcomes for the sum of two dice are given by the number of pairs (x, y) such that $x + y = 9$. The possible pairs are:

$$(3, 6), (4, 5), (5, 4), (6, 3)$$

There are 4 favorable outcomes out of a total of 36 possible outcomes when two dice are thrown. Thus, the probability is:

$$P(\text{sum} = 9) = \frac{4}{36} = \frac{1}{9}$$

The correct answer is $\frac{1}{9}$.

Answer: (A)

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	D	3	A	4	A	5	A
6	A	7	A	8	C	9	A	10	A
11	A	12	A	13	A	14	C	15	A
16	A	17	A	18	A	19	A	20	A
21	A	22	A	23	A	24	A	25	C
26	A	27	A	28	A	29	B	30	A
31	A	32	A	33	D	34	B	35	A
36	B	37	B	38	B	39	C	40	B
41	A	42	A	43	A	44	A	45	A
46	D	47	A	48	A	49	A	50	A