Choose the correct or the most suitable answer from the given four alternatives:

1. If $|adj(adjA)|=|A|^9$, then the order of the square matrix A is

(1)3 (2)4 (3)2 (4)5

2. If A $\begin{bmatrix}1 & -2\\1 & 4\end{bmatrix}=\begin{bmatrix}6 & 0\\0 & 6\end{bmatrix}$, then A =

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

(1) $\frac{2\pi}{3}$ (2) $\frac{3\pi}{4}$ (3) $\frac{5\pi}{6}$ (4) $\frac{\pi}{4}$

3. 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} =

(1) $\begin{bmatrix}2 & -5\\-3 & 8\end{bmatrix}$ (2) $\begin{bmatrix}8 & 5\\3 & 2\end{bmatrix}$ (3) $\begin{bmatrix}3 & 1\\2 & 1\end{bmatrix}$ (4) $\begin{bmatrix}8 & -5\\-3 & 2\end{bmatrix}$

4. If A = $\begin{bmatrix}cos\theta & sin\theta\\-sin\theta & cos\theta\end{bmatrix}$ and A(adjA) = $\begin{bmatrix}k & 0\\0 & k\end{bmatrix}$, then k is

(1) 0 (2) $\sin\theta$ (3) $\cos\theta$ (4) 1

5. Let $A=\begin{bmatrix}2 & -1 & 1\\-1 & 2 & -1\\1 & -1 & 2\end{bmatrix}$ and $4B=\begin{bmatrix}3 & 1 & -4\\1 & 3 & x\\-1 & 1 & 3\end{bmatrix}$.If B is the inverse of A. then the value of x is

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

6. $i^n+i^{n+1}+i^{n+2}+i^{n+3}$ is

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

7. If z is a non zero complex number, such that $2iz^2=\bar{z}$, then $|z|$ is

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

8. If z is a complex number such that $z\in\mathbb{C}\backslash\mathbb{R}$ and $z+\frac{1}{z}\in\mathbb{R}$, then $|z|$ is

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

9. The principal argument of $\frac{3}{-1+i}$ is

(1) $\frac{-5\pi}{6}$ (2) $\frac{-2\pi}{3}$ (3) $\frac{-3\pi}{4}$ (4) $\frac{-\pi}{2}$

10. The value of $\left(\frac{1+\sqrt{3}i}{1-\sqrt{3}i}\right)^{10}$ is

(1) $cis\ \frac{2\pi}{3}$ (2)$cis\ \frac{4\pi}{3}$ (3)$-cis\ \frac{2\pi}{3}$ (4)$-cis\ \frac{4\pi}{3}$

11. If f and g are polynomials of degrees m and n respectively, and if $h(x)=(fog)(x)$, then the degree of h is

(1) mn (2) $m+n$ (3) m^n (4) n^m

12. The polynomial x^3-kx^2+9xhas three real zeros if and only if, k satisfies

(1) $|k|\le 6$ (2) $k=0$ (3) $|k|>6$ (4) $|k|\ge 6$

13. If $=\frac{1}{5}$, the value of $cos\ (cos^{-1}x+2\ sin^{-1}x)$ is

(1) $-\sqrt{\frac{24}{25}}$ (2) $\sqrt{\frac{24}{25}}$ (3) $\frac{1}{5}$ (4) $-\frac{1}{5}$

14. If $cot^{-1}\ 2$ and $cot^{-1}\ 3$ are two angles of a triangle, then the third angle is

(1) $\frac{\pi}{4}$ (2) $\frac{3\pi}{4}$ (3) $\frac{\pi}{6}$ (4) $\frac{\pi}{3}$

15. $\sin(tan^{-1}x)$, $|x| < 1$ is equal to

(1) $\frac{x}{\sqrt{1-x^2}}$ (2) $\frac{1}{\sqrt{1-x^2}}$ (3) $\frac{1}{\sqrt{1+x^2}}$ (4) $\frac{x}{\sqrt{1+x^2}}$

16. $sin^{-1}\frac{3}{5} - cos^{-1}\frac{12}{13} + sec^{-1}\frac{5}{3} - cosec^{-1}\frac{13}{12}$ is equal to

(1) 2π (2) π (3) 0 (4) $tan^{-1}\frac{12}{65}$

17. The radius of the circle$3x^2 + by^2 + 4bx - 6by + b^2$ is

(1) 1 (2) 3 (3) $\sqrt{10}$ (4) $\sqrt{11}$

18. The radius of the circle passing through the point (6,2) two of whose diameter are $x + y = 6$ and $x + 2y = 4$ is

(1) 10 (2) $2\sqrt{5}$ (3) 6 (4) 4

19. The equation of the circle passing through the foci of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ having centre at (0,3) is

(1) $x^2 + y^2 - 6y - 7 = 0$ (2) $x^2 + y^2 - 6y + 7 = 0$

(3) $x^2 + y^2 - 6y - 5 = 0$ (4) $x^2 + y^2 - 6y + 5 = 0$

20. The eccentricity of the ellipse $(x-3)^2 + (y-4)^2 = \frac{y^2}{9}$ is

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

21. If the coordinates at one end of a diameter of the circle $x^2 + y^2 - 8x - 4y + c$ are (11,2), the coordinates of the other end are

(1) $(-5,2)$ (2) $(2,-5)$ (3) $(5,-2)$ (4) $(-2,5)$

22. If the planes $\vec{r}\cdot(2\hat{\imath} - \lambda\hat{\jmath} + \hat{k}) = 3$ and $\vec{r}\cdot(4\hat{\imath} + \hat{\jmath} - \mu\hat{k}) = 5$ are parallel, then the value of λ and μ are

(1) $\frac{1}{2}, -2$ (2) $-\frac{1}{2}, 2$ (3) $-\frac{1}{2}, -2$ (4) $\frac{1}{2}, 2$

23. Distance from the origin to the plane $3x - 6y + 2z + 7 = 0$ is

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

24. If $\vec{a} = 2\hat{\imath} + 3\hat{\jmath} - \hat{k}$, $\vec{b} = \hat{\imath} + 2\hat{\jmath} - 5\hat{k}$, $\vec{c} = 3\hat{\imath} + 5\hat{\jmath} - \hat{k}$ then a vector perpendicular to $\vec{a}$ and lies in The plane containing $\vec{b}$ and $\vec{c}$ is

(1) $-17\hat{\imath} + 21\hat{\jmath} - 97\hat{k}$ (2) $-17\hat{\imath} + 21\hat{\jmath} - 123\hat{k}$

(3) $-17\hat{\imath} + 21\hat{\jmath} + 97\hat{k}$ (4) $-17\hat{\imath} - 21\hat{\jmath} - 97\hat{k}$

25. 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

(1) 81 (2) 9 (3) 27 (4) 18

26. If $\vec{a}, \vec{b}, \vec{c}$ are three unit vectors such that $\vec{a}$ is perpendicular to $\vec{b}$, and is parallel to $\vec{c}$ then $\vec{a}\times(\vec{b}\times\vec{c})$ is equal to

(1) $\vec{a}$ (2) $\vec{b}$ (3) $\vec{c}$ (4) $\vec{0}$

27. The number given by the Rolle's theorem for the function $x^3 - 3x^2$, $x \in [0,3]$ is

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

28. The tangent to the curve y^2-xy+9=0 is vertical when

(1) y = 0 (2) y = $\pm\sqrt{3}$ (3) y = $\frac{1}{2}$ (4) y = ± 3

29. The function $\sin^4 x + \cos^4 x$ is increasing in the interval

(1) $\left[\frac{5\pi}{8}, \frac{3\pi}{4}\right]$ (2) $\left[\frac{\pi}{2}, \frac{5\pi}{8}\right]$ (3) $\left[\frac{\pi}{4}, \frac{\pi}{2}\right]$ (4) $\left[0, \frac{\pi}{4}\right]$

30. The minimum value of the function $|3 - x| + 9$ is

(1) 0 (2) 3 (3) 6 (4) 9

31. Linear approximation for $g(x) = \cos x$ at $x = \frac{\pi}{2}$ is

(1) $x + \frac{\pi}{2}$ (2) $-x + \frac{\pi}{2}$ (3) $x - \frac{\pi}{2}$ (4) $-x - \frac{\pi}{2}$

32. If $W(x,y,z) = x^2(y-z) + y^2(z-x) + z^2(x-y)$, then $\frac{\partial w}{\partial x} + \frac{\partial w}{\partial y} + \frac{\partial w}{\partial z}$ is

(1) $xy + yz + zx$ (2) $x(y+z)$ (3) $y(z+x)$ (4) 0

33. If $(x,y,z) = xy + yz + zx$, then $f_x - f_z$ is equal to

(1) $z - x$ (2) $y - z$ (3) $x - z$ (4) $y - z$

34. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \sin^2 x \cos x \, dx$ is

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

35. The area between $y^2 = 4x$ and its latus rectum is

(1) $\frac{2}{3}$ (2) $\frac{4}{3}$ (3) $\frac{8}{3}$ (4) $\frac{5}{3}$

36. The value of $\int_0^\infty e^{-3x} x^2 \, dx$ is

(1) $\frac{7}{27}$ (2) $\frac{5}{27}$ (3) $\frac{4}{27}$ (4) $\frac{2}{27}$

37. If $\int_0^x f(t)\,dt = x + \int_x^1 t\,f(t)\,dt$, then the value of $f(1)$ is

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

38. A computer salesperson knows from his past experience that he sells computers to one in every twenty customers who enter the showroom. What is the probability that he will sell a computer to exactly two of the next three customers?

(1) $\frac{57}{20^3}$ (2) $\frac{57}{20^2}$ (3) $\frac{19^3}{20^3}$ (4) $\frac{57}{20}$

39. Two coins are to be flipped. The first coin will land on heads with probability 0.6, the second with Probability 0.5. Assume that the results of the flips are independent, and let X equal the total

number of heads that result. The value of E[X] is

(1) 0.11 (2) 1.1 (3) 11 (4) 1

40. The probability function of a random variable is defined as:

x	-2	-1	0	1	2
F(x)	k	2k	3k	4k	5

Then $E(X)$ is equal to:

(1) $\frac{1}{15}$ (2) $\frac{1}{10}$ (3) $\frac{1}{3}$ (4) $\frac{2}{3}$

41. If in 6 trials, X is a binomial variate which follows the relation $9P(X=4) = P(X=2)$, then the probability of success is

(1) 0.125 (2) 0.25 (3) 0.375 (4) 0.75

42. A binary operation on a set S is a function from

(1) $S \to S$ (2) $(S \times S) \to S$ (3) $S \to (S \times S)$ (4) $(S \times S) \to (S \times S)$

43. The operation * defined by $a * b = \frac{ab}{7}$ is not a binary operation on

(1) $\mathbb{Q}^+$ (2) $\mathbb{Z}$ (3) $\mathbb{R}$ (4) $\mathbb{C}$

44. Which one is the inverse of the statement $(p \vee q) \to (p \wedge q)$?

(1) $(p \wedge q) \to (p \vee q)$ (2) $\neg (p \vee q) \to (p \wedge q)$

(3) $(\neg p \vee \neg q) \to (\neg p \wedge \neg q)$ (4) $(\neg p \wedge \neg q) \to (\neg p \vee \neg q)$

45. The proposition $p \wedge (\neg p \vee q)$ is

(1) a tautology (2) a contradiction

(3) logically equivalent to $p \wedge q$ (4) logically equivalent to $p \vee q$

46. If y= $\cos(\sin x^2)$, then $\frac{dy}{dx}$ at x = $\sqrt{\frac{\pi}{2}}$ is

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

47. If f(x) = $x\tan^{-1}x$, then f'(1) is

(1)1+$\frac{\pi}{4}$ (2)$\frac{1}{2}+\frac{\pi}{4}$ (3) $\frac{1}{2}-\frac{\pi}{4}$ (4)2

48. If y= $\frac{(1-x)^2}{x^2}$, then $\frac{dy}{dx}$ is

(1)$\frac{2}{x^2}+\frac{2}{x^3}$ (2)$-\frac{2}{x^2}+\frac{2}{x^3}$ (3)$-\frac{2}{x^2}-\frac{2}{x^3}$ (4) $\frac{2}{x^2}-\frac{2}{x^3}$

49. If g(x) = (x^2+2x+3)f(x) and f(0) = 5 and $\lim_{x\to 0}\frac{f(x)-5}{x} = 4$, then g'(0) is

(1)20 (2)14 (3)18 (4)12

50. The number of points in R in which the function f(x) = $|x-1|+|x-3|+\sin x$ is not differentiable is

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