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MATHS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

QUESTION PAPER 2019

Mathematics

1. The domain of the function

$f(x) = \sin^{-1}\left[\log_4\left(\frac{x}{4}\right)\right] + \sqrt{17x - x^2 - 16}$ is

A. [-1, 1]

B. [1, 4]

C. (0, 16]

D. [1, 16]

Answer: D

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2. If $f:[1,\infty)\to[2,\infty)$ is given by $f(x)=x+\dfrac{1}{x}$ then $f^{-1}(x)=$

A. $x+\sqrt{x^2+4}$

B. $\dfrac{x}{x^2-1}$

C. $\dfrac{1}{2}\left[x+\sqrt{x^2+4}\right]$

D. $\dfrac{1}{2}\left[x-\sqrt{x^2+4}\right]$

Answer: C

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3. If the greatest divisor $30\cdot 5^{2n}+4\cdot 2^{3n}$ is $p,\ \forall n\in N$ and that of $2^{2n+1}-6n-2$ is $q,\ \forall n\in N$, then $p+q=$

A. 26

B. 52

C. 104

D. 13

Answer: B

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4. If $A = \begin{bmatrix} 0 & 5 \\ 0 & 0 \end{bmatrix}$ and $f(x) = x + x^2 + \dots + x^{2018}$, then $f(A) + I =$

A. $\begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$

B. $\begin{bmatrix} 1 & 5 \\ 0 & 0 \end{bmatrix}$

C. $\begin{bmatrix} 0 & 5 \\ 1 & 1 \end{bmatrix}$

D. $\begin{bmatrix} 1 & 5 \\ 0 & 1 \end{bmatrix}$

Answer: D

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5. If a , b, c are real numbers such that $a-b=1, b-c=3$, then the number of matrices of the form $A\begin{bmatrix}1 & 1 & 1\\ a & b & c\\ a^2 & b^2 & c^2\end{bmatrix}$ such that $|A|=-12$, is

A. 1

B. 2

C. 3

D. infinitely many

Answer: D

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6. For what values of 'a' , the system of equations $x + y + z = 1, 2x + 3y + 2z = 2, ax + ay + 2az = 4$ will have a unique solution ?

A. For $a = 0$ only

B. For all $a \in R - \{0\}$

C. For all $a \in Q$

D. For all a $\notin N$

Answer: B

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7. If $z_n = \left(1 + i\sqrt{2}\right)^n, n \in Z$, then $\frac{1}{9} Re(z_4 \bar{z}_5) =$

A. 81

B. 27

C. 9

D. 3

Answer: C

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8. If $z = x + iy$, then the centre of the circle $\left|\frac{z-3}{z-2i}\right| = 2$, is

A. $\left(-1, -\frac{8}{3}\right)$

B. $\left(1, \frac{8}{3}\right)$

C. $\left(-1, \frac{8}{3}\right)$

D. $\left(1, -\frac{8}{3}\right)$

Answer: C

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9. If z is a complex number such that $|z+4| \geq 3,$ then the smallest value of $|z+3|$ is

A. 3

B. 1

C. 2

D. 0

Answer: C

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10. The real part of z that satisfies $iz^4+1=0$ is

A. $\sin.\frac{\pi}{4}$

B. $\cos.\frac{\pi}{8}$

C. 0

D. -1

Answer: B

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11. If x is real, then the interval in which no value of the expression $\frac{2(x^2+2x-11)}{2x-5}$ lies, is

A. (2, 5)

B. (3, 6)

C. (3, 4)

D. (6, 8)

Answer: D

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12. The set of all real values of x satisfying the inequalities $x^2 - 4x + 3 > 0$ and $x^2 - 2x - 8 \le 0$, is

A. $[-2, 1) \cup (3, 4]$

B. $[-1, 2) \cup (3, 4)$

C. $[-2, 2) \cup (2, 4)$

D. $[0, 2) \cup (3, 5)$

Answer: A

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13. If the roots α, β, γ of the equation $x^3 - 6x^2 + px + 10 = 0$are in arithmetic progression, then $\alpha^3 + \beta^3 + \gamma^3 =$

A. 132

B. 134

C. 629

D. 645

Answer: A

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14. α, β, γ are the roots of the cubic equation $x^3 + p_1x^2 + p_2x + p_3 = 0$. If $S_r = \alpha^r + \beta^r + \gamma^r$, $S_1 = 10$, $S_2 = 38$ and $S_3 = -1840$, then $p_3 =$

A. -30

B. $\frac{1910}{3}$

C. 631

D. -31

Answer: B

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15. The number of 4 letter permutations formed with English alphabet such that the number of distinct vowels is equal to the number of distinct consonants, when repetition is allowed, is

A. 630

B. $3^5 \times 70$

C. $3^6 \times 70$

D. $3^4 \times 60$

Answer: C

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16. A student is asked to answer 10 out of 13 questions is an examination such that he must answer atleast four questions from the first five questions. The number of choices available to him is

A. 140

B. 176

C. 196

D. 280

Answer: C

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17. If the 17^{th} and the 18^{th} terms in the expansion of $(2+a)^{50}$ are equal, then the coefficient of x^{35} in the expansion of $(a+x)^{-2}$ is

A. -35

B. 35

C. 36

D. -36

Answer: D

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18. If the k^{th} term in the expansion of $\left(\frac{3}{2}x^2 - \frac{1}{3x}\right)^6$ is independent of x, then the numerically greatest term in the expansion of $\left(\frac{3}{2}x^2 - \frac{1}{3x}\right)^k$ when $x = \frac{2}{3}$, is

A. $\frac{40}{81}$

B. $\left(\frac{7}{6}\right)^5$

C. $\frac{20}{27}$

D. $\left(\frac{7}{6}\right)^4$

Answer: C

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19. If $\frac{27x^2+32x+16}{(3x+2)^2(1-x)} = \frac{A}{3x+2} + \frac{B}{(3x+2)^2} + \frac{C}{1-x}$, then $AB+BC+CA=$

A. 6

B. 12

C. 24

D. 48

Answer: B

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20. If the angles of depression of the top and bottom of a short building from the top of a tall building are 30° and 60° respectively, then the ratio of the heights of short and tall buildings is

A. $2:3$

B. $1:2$

C. $1:3$

D. $1:4$

Answer: A

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21. Find the value of $\cos 18^\circ$

A. $\frac{1}{8}(5-\sqrt{5})$

B. $\frac{1}{2\sqrt{2}}\sqrt{5+\sqrt{5}}$

C. $\frac{\sqrt{5}-1}{4}$

D. $\frac{\sqrt{5}+1}{4}$

Answer: B

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22. If $A+B+C=\pi$, then $\sin A-\sin B+\sin C=$

A. $4\cos\left(\frac{A}{2}\right)\cos\left(\frac{B}{2}\right)\cos\left(\frac{C}{2}\right)$

B. $4\sin\left(\frac{A}{2}\right)\sin\left(\frac{B}{2}\right)\cos\left(\frac{C}{2}\right)$

C. $\sin\left(\frac{A}{2}\right)\cos\left(\frac{B}{2}\right)\sin\left(\frac{C}{2}\right)$

D. $4\sin\left(\frac{A}{2}\right)\cos\left(\frac{B}{2}\right)\sin\left(\frac{C}{2}\right)$

Answer: D

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23. For $n\in Z$, the general solution of the trigonometric equation

$\sin x-\sqrt{3}\cos x+4\sin 2x-4\sqrt{3}\cos 2x+\sin 3x-\sqrt{3}\cos 3x=0$

is

A. $\frac{n\pi}{2} + \frac{\pi}{8}$

B. $\frac{n\pi}{2} + \frac{\pi}{6}$

C. $\frac{n\pi}{2} \pm \frac{\pi}{6}$

D. $2n\pi \pm \frac{\pi}{6}$

Answer: B

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24. For $a > 0$, if $f(x) = ax + b$ is an onto function from $[-1, 1]$ to $[0, 2]$ then $\cot\left[\tan^{-1}.\frac{1}{7} + \tan^{-1}.\frac{1}{8} + \tan^{-1}.\frac{1}{5}\right] =$

A. $f(-1)$

B. $f(1)$

C. $f(0)$

D. $f(2)$

Answer: B

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25. The solution of the equation $2\cos h2x + 10\sin h2x = 5$ is

A. $\frac{1}{2}\log\left(\frac{3}{5}\right)$

B. $\frac{1}{2}\log\left(\frac{4}{3}\right)$

C. $\frac{1}{2}\log\left(\frac{5}{4}\right)$

D. $\frac{1}{2}\log\left(\frac{5}{3}\right)$

Answer: B

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26. In a triangle ABC, if $a^2 - b^2 - c^2 = bc(\lambda^2 - 2\lambda - 1)$, then

A. $0 \leq \lambda \leq 4$

B. $-1 \leq \lambda \leq 2$

C. $-1 \leq \lambda \leq 3$

D. $0 \leq \lambda \leq 3$

Answer: C

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27. If a and b respectively represent the lengths of a side and a diagonal of a regular pentagon that is inscribed in a circle, then $\frac{b}{a} =$

A. $2\sin.\ \frac{\pi}{5}$

B. $2\cos.\ \frac{\pi}{5}$

C. $\cos.\ \frac{\pi}{5}$

D. $\sin.\ \frac{\pi}{5}$

Answer: B

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28. In a right angled triangle, if the difference between the two acute angles is 60°, then the ratio of the lengths of the hypotenuse and the perpendicular drawn to the hypotenuse from its opposite vertex is

A. $2:1$

B. $4:1$

C. $8:1$

D. $3:1$

Answer: B

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29. If the position vectors of the points A, B, C, D given by $\hat{i}+2\hat{j}+3\hat{k}, 2\hat{i}-\hat{j}+2\hat{k}, \frac{1}{4}\left(7\hat{i}+15\hat{j}+15\hat{k}\right)$ and $\frac{1}{3}\left[7\hat{i}+2\hat{j}+(5+3a)\hat{k}\right]$ respectively are such that $|AC|=|BD|$, then $16(3a-1)^2=$

A. 143

B. 139

C. 189

D. 187

Answer: D

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30. If the points $2a+3b-c, a-2b+3c, 3a+\lambda b-2c$ and $a-6b+6c$ are coplanar, then the direction cosines of the vector $\lambda\hat{i}-2\lambda\hat{j}+\hat{k}$ are

A. $\frac{2}{\sqrt{21}}, \frac{-4}{\sqrt{21}}, \frac{1}{\sqrt{21}}$

B. $-\frac{2}{\sqrt{78}}, \frac{5}{\sqrt{78}}, \frac{7}{\sqrt{78}}$

C. $\frac{4}{9}, \frac{8}{9}, \frac{1}{9}$

D. $\frac{2}{3}, -\frac{2}{3}, -\frac{1}{3}$

Answer: C

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31. If L_1 is a line through the point $5\hat{i}+8\hat{j}+11\hat{k}$ and parallel to the vector $2\hat{i}+3\hat{j}+4\hat{k}$ and L_2 is a line through the point $4\hat{i}+6\hat{j}+8\hat{k}$ and parallel to the intersection of L_1 and L_2 is

A. $\hat{i}+\hat{j}+\hat{k}$

B. $\hat{i}+2\hat{j}+3\hat{k}$

C. $2\hat{i}+3\hat{j}+\hat{k}$

D. $\hat{i}-2\hat{j}+2\hat{k}$

Answer: B

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32. $a = 4\hat{i} + 3\hat{j}$ and b are two vectors in XOY plane and a is perpendicular to b. A vector c lying in the same plane and having projections 1 and 2 respectively a and b is

A. $2\hat{i} - \hat{j}$

B. $2\hat{i} + \hat{j}$

C. $\hat{i} + 2\hat{j}$

D. $2\hat{i} + 2\hat{j}$

Answer: A

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33. If $OA = 6\hat{i} + 3\hat{j} - 4\hat{k}, OB = 2\hat{j} + \hat{k}, OC = 5\hat{i} - \hat{j} + 2\hat{k}$ are the coterminous edges of a parallelopiped, then the height of the parallelopiped drawn from the vertex A is

A. $\frac{85}{3}$

B. $\frac{5}{\sqrt{32}}$

C. $\frac{85}{\sqrt{257}}$

D. $\frac{17}{\sqrt{6}}$

Answer: D

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34. The shortest distance between the lines

$r = \left(-2\hat{i} + \hat{j} - \hat{k}\right) + r\left(3\hat{i} + 3\hat{j} - \hat{k}\right)$ and

$r = \left(\hat{i} - \hat{j} + 2\hat{k}\right) + k\left(-1\hat{i} + 2\hat{j} + 4\hat{k}\right)$ is

A. 0

B. $\frac{10}{\sqrt{6}}$

C. $\frac{11}{\sqrt{6}}$

D. $\frac{13}{\sqrt{6}}$

Answer: C

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35. The mean deviation from the median of the data 16, 22, 3, 14, 5, 10, 8, 6, 11, 4 is

A. 5

B. 5.7

C. 4.7

D. 4

Answer: C

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36. The variance of the following frequency distribution is

Class Interval	$0-4$	$4-8$	$8-12$	$12-16$	$16-20$
Frequency	2	4	6	3	1

A. $\frac{295}{16}$

B. $\frac{304}{16}$

C. $\frac{37}{4}$

D. $\frac{97}{4}$

Answer: A

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37. The two events E_1, E_2 are such that

$P(E_1 \cup E_2) = \frac{5}{8}, P(\overline{E}_1) = \frac{3}{4}, P(E_2) = \frac{1}{2}$, then E_1 and E_2 are

A. independent events

B. mutually exclusive events

C. exhaustive events

D. not independent events

Answer: A

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38. If a die is rolled twice and the sum of the numbers appearing on them is observed to be 6, then the probability that the number 1 appears atleast once on them is

A. $\frac{5}{36}$

B. $\frac{2}{5}$

C. $\frac{11}{36}$

D. $\frac{1}{3}$

Answer: B

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39. An examination is attempted by 5000 graduates, 2000 post-graduates and 1000 doctorate holders, The probabilities that a graduate, a post graduate and a doctorate holder will pass the examination are $\frac{2}{3}, \frac{3}{4}, \frac{4}{4}$ respectively. If one of the examine passed the examination, then the probability that he is a post-graduate is

A. $\frac{45}{169}$

B. $\frac{100}{169}$

C. $\frac{24}{169}$

D. $\frac{5}{64}$

Answer: A

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40. The pobability distribution of a discrete random variable X is given below. If

$E(X^2) = \Sigma x^2 P(X = x)$, then $6E(X^2) - Var(X) =$

$X = x$	-1	0	1	2
$P(X = x)$	$\frac{1}{3}$	$\frac{1}{6}$	$\frac{1}{6}$	$\frac{1}{3}$

A. $\frac{1}{12}$

B. $\frac{19}{12}$

C. $\frac{113}{12}$

D. $\frac{12}{113}$

Answer: C

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41. If X is a Poision variable representing number of successes in 50 trials such that $2P(X=1)=5P(X=5)+2P(X=3)$, then the probability of getting succes in one trial is

A. $2e^{-2}$

B. 0.03

C. 0.04

D. 0.05

Answer: C

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42. Let $\lim_{l \to 0} (1+5t)^{\frac{1}{t}} = K$ and X be the random variable representing number of successes in 100 independent trials. If the

probability of success in each trial is 0.05, then the probability of getting at least one success is

A. $\frac{1-K}{K}$

B. $\frac{K-1}{K}$

C. $\frac{K+1}{2K}$

D. $\frac{5K+2}{7K}$

Answer: B

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43. If the origin is shifted to a point (h, k) by translation of axes in order to make the equation $x^2+5xy+2y^2+5x+6y+7=0$ free from first order terms, then

A. $h=-\frac{10}{17}, k=\frac{13}{17}$

B. $h=-\frac{10}{17}, k=-\frac{13}{17}$

C. $h = \frac{10}{17}, k = \frac{13}{17}$

D. $h = \frac{10}{17}, k = -\frac{13}{17}$

Answer: B

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44. Suppose a line makes an angle of 120° with the positive direction of X-axis. If the length of the perpendicular from origin to that line is 4, then the equation of the line is

A. $-\sqrt{3}x + y = 8$

B. $\sqrt{3}x + y = 8$

C. $\sqrt{3}x - y = 8$

D. $\sqrt{3}x + y = -8$

Answer: B

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45. Two straight lines are drawn through the points (0, 2) such that the length of the perpendiculars from the point (4, 4) to these lines are each equal to 2 units. The equation of the line joining the feet of these perpendiculars is

A. $y + x = 5$

B. $2y + 3x = 8$

C. $y - 2x = 10$

D. $y + 2x = 10$

Answer: D

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46. Two points $A(-a, 0)$ and $B(a, 0)$ are given. If C is a variable point lying on one side of the line AB such that $\angle CAB - \angle CBA = \alpha$, where α is a positive constant, then locus of the point C is

A. $a^2 + x^2 + y^2 + 2xy \cot \alpha = 0$

B. $a^2 - x^2 + y^2 + 2xy \cot \alpha = 0$

C. $a^2 - x^2 - y^2 + 2xy \tan \alpha = 0$

D. $a^2 - x^2 + y^2 + 2xy \tan \alpha = 0$

Answer: B

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47. If the angle between the pair of lines $x^2 + 2\sqrt{2}xy + ky^2 = 0, k > 0$ is 45°, then the area (in square units) of the triangle formed by the pair of bisectors of angles between the given lines and the line $x + 2y + 1 = 0$ is

A. $\frac{1}{3}$

B. 1

C. $\frac{2}{3}$

D. 2

Answer: A

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48. If d is the distance between the point of intersection of the lines $x^2 + 4xy + ky^2 - 4x - 10y + 3 = 0$ and the origin and p is the product of the perpendicular distances from the origin to these lines, then $d^2 - 20p^2 =$

A. 8

B. 4

C. 2

D. 0

Answer: A

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49. A line meets coordinate axes in A and B. A circle is circumscribed about the triangle OAB . If m and n are distances of tangent to circle at origin from the point A and B respectively then diameter of the circle is

A. $\frac{m+n}{2}$

B. $\frac{3(m+n)}{4}$

C. $m+n$

D. $2(m+n)$

Answer: C

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50. The centre of the circle passing through the point (0, 1) and touching the curve $y = x^2$ at (2, 4) is

A. $\left(\frac{16}{5}, \frac{53}{10}\right)$

B. $\left(\frac{-2}{3}, \frac{-4}{3}\right)$

C. $\left(\frac{-4}{3}, \frac{2}{3}\right)$

D. $\left(\frac{-16}{5}, \frac{53}{10}\right)$

Answer: D

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51. If the number of common tangents to the pair of circles $x^2 + y^2 - 2x + 4y - 4 = 0$ and $x^2 + y^2 + 4x - 4y + \alpha = 0$ is 4, then the least integral value of α is

A. 4

B. 5

C. 6

D. 7

Answer: B

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52. Find the equation of the circle which touches the circle $x^2 + y^2 - 2x - 4y - 20 = 0$ externally at $(5, 5)$ with radius 5.

A. $x^2 + y^2 + 18x + 16y - 220 = 0$

B. $x^2 + y^2 - x - y - 40 = 0$

C. $x^2 + y^2 + 2x - 3y - 45 = 0$

D. $x^2 + y^2 - 18x - 16y + 120 = 0$

Answer: D

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53. The equation of a circle with the circle $x^2 + y^2 - 6x + 12y + 15 = 0$ and having area that is twice the area of the given circle is

A. $x^2 + y^2 - 6x + 12y - 15 = 0$

B. $x^2 + y^2 - 6x + 12y - 30 = 0$

C. $x^2 + y^2 - 6x + 12y - 60 = 0$

D. $x^2 + y^2 - 6x + 12y + 15 = 0$

Answer: A

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54. If the locus of a point which divides a chord with slope 2 of the parabola $y^2 = 4x$, internally in the ratio $1:3$ is a parabola, then its vertex is

A. (2, 1)

B. $\left(\frac{3}{16}, \frac{3}{2}\right)$

C. $\left(\frac{3}{4}, \frac{3}{16}\right)$

D. $\left(\frac{3}{16}, \frac{3}{4}\right)$

Answer: D

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55. If the normal at one end of the latusrectum of the parabola $y^2 = 16x$ meets the X-axis at the point P, then the length of the chord passing through P and perpendicular to the normal is

A. $48\sqrt{2}$

B. $32\sqrt{2}$

C. $24\sqrt{2}$

D. $20\sqrt{2}$

Answer: B

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56. Assertion (A) If the tangent and normal to the ellipse $9x^2 + 16y^2 = 144$ at the point $P\left(\frac{\pi}{3}\right)$ on it meet the major axis in Q and R respectively, then $QR = \frac{57}{8}$.

Reason (R) If the tangent and normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} =$ at the point $P(\theta)$ on it meet the major axis in Q and R respectively, then

$$QR = \left|\frac{a^2 \sin^2 \theta - b^2 \cos^2 \theta}{a \cos \theta}\right|$$

The correct answer is

A. Both (A) and (R) are true and (R) is the correct explanation of (A).

B. Both (A) and (R) are true but (R) is not the correct explanation of (A).

C. (A) is true but (R) is false.

D. (A) is false but (R) is true.

Answer: C

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57. If $x + y + n = 0, n > 0$ is a normal to the ellipse $x^3 + 3y^2 = 3$ and $x^2 + 5y^2 = 5$, then the point of intersection of these two lines satisfy the equation

A. $\frac{x^2}{64} - \frac{y^2}{25} = 1$

B. $x - 5y + 5 = 0$

C. $x^2 = \frac{2}{3}y + 1$

D. $y^2 = -25x + 3$

Answer: B

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58. The product of lengths of the perpendiculars from the point of the hyperbola $x^2 - y^2 = 8$ to its asymptotes is

A. 2

B. 3

C. 4

D. 8

Answer: C

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59. If a triangle ABC with two vertices A(5, 4, 6) and B(1, -1, 3) has its centroid at $\left(\frac{10}{3}, 2, \frac{11}{3}\right)$ then the third vertex C is

A. (4, 2, 3)

B. (-4, -3, 2)

C. (4, 3, 2)

D. (2, 4, 3)

Answer: C

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60. Let ABC be a triangle with $A(\alpha, 5, \beta), B(-2, 1, 6)$ and $C(1, 0, -3)$ as its vertices. If the median through B is equally inclined to the coordinate axes, then $\alpha + \beta =$

A. 10

B. 12

C. 14

D. 16

Answer: D

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61. The equation of the plane in cartesian form, which is at a distance of $\frac{6}{\sqrt{29}}$ from the origin and its normal vector drawn from the origin being $2\hat{i} - 3\hat{j} + 4\hat{k}$, is

A. $2x - 3y + 4z = 6$

B. $2x + 3y - 4z = 6$

C. $-2x - 3y + 4z = 6$

D. $2x + 3y + 4z = -6$

Answer: A

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62. $\lim_{x \to 0} \left(\frac{\sinh 2x}{2x}\right)^{\frac{1}{x^2}} =$

A. 0

B. $e^{\frac{1}{3}}$

C. $e^{\frac{2}{3}}$

D. $e^{\frac{4}{3}}$

Answer: C

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63. If the function $f: R \to R$ defined by

$$\begin{cases} a\left(\frac{1-\cos 2x}{x}\right), & \text{for} \quad x<0 \\ \text{b}, & \text{for} \quad x=0 \\ \frac{\sqrt{x}}{\sqrt{4+\sqrt{x}}-2}, & \text{for} \quad x>0 \end{cases}$$

is continuous at $x=0$, then $a+b=0$

A. 2

B. 4

C. 6

D. 8

Answer: C

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64. If $f(x)=\cos h^{-1}\left(\frac{1-x}{1+x}\right)$ is well defined, then $f'(x)=$

A. $\dfrac{-1}{(1+x)\sqrt{-x}}$

B. $\dfrac{1}{(1+x)\sqrt{x}}$

C. $\dfrac{-1}{(1+x)\sqrt{x}}$

D. $\dfrac{1}{(1+x)\sqrt{-x}}$

Answer: A

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65. Match the items of List-I with those of List-II

	List-I		List-II
A.	If $y = \|x\| + \|x-2\|$, then at $x = 2$, $\frac{dy}{dx} =$	I.	2
B.	If $f(x) = \|\cos 2x\|$, then $f'\left(\frac{\pi}{4}+\right) =$	II.	0
C.	If $f(x) = \sin \pi[x]$, where $[x]$ is the greatest integer function, then $f'(1-) =$	III.	-2
D.	If $f(x) = \log\|x-1\|$, $x \neq 1$ then $f'\left(\frac{1}{2}\right) =$	IV.	does not exist

The correct matching is

A.
A	B	C	D
I	IV	II	III

B.
A	B	C	D
IV	III	I	II

C.
A	B	C	D
IV	I	III	II

D.
A	B	C	D
IV	I	II	III

Answer: D

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66. If $\frac{dy}{dx} = 4$ and $\frac{d^2x}{dy^2} = -3$ at a point P on the curve $y = f(x)$, then $\left(\frac{d^2x}{dy^2}\right)_p =$

A. 0

B. $-\frac{3}{4}$

C. $\frac{3}{16}$

D. $\frac{3}{64}$

Answer: D

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67. The approximate value of $\tan^{-1}(0.999)$ (upto 4 decimal places) is

A. 0.7852

B. 0.7102

C. 0.8127

D. 0.7526

Answer: A

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68. If the normal to the curve $y = f(x)$ at (1, 2) make an angle $\frac{3\pi}{4}$ with positive X-axis, then

$f'(1) =$

A. 0

B. 1

C. 2

D. 3

Answer: B

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69. The number of real roots of the equation $e^{x-1}+x-2=0$ is

A. 0

B. 1

C. 2

D. 3

Answer: B

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70. Let $f: D \rightarrow R, D \subseteq R, c \in D$ and r be a non zero real number.

Consider the following statements :

I. c is an extreme point of $f \Rightarrow c$ is an extreme point of rf

II. c is an extreme point of $f \Rightarrow c$ is an extreme point of $r + f$

Which of the following is correct ?

A. Only (i) is true

B. Only (ii) is true

C. Both (i) and (ii) are true

D. Neither (i) nor (ii) is true

Answer: C

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71. $\int \frac{dx}{(1+x)\sqrt{8+7x-x^2}} =$

A. $-\frac{2}{9}\sqrt{\frac{8-x}{1+x}}+c$

B. $-\frac{1}{9}\sqrt{\frac{1+x}{8-x}}+c$

C. $-\frac{2}{9}\sqrt{\frac{1+x}{8-x}}+c$

D. $\frac{2}{9}\sqrt{\frac{8+x}{1+x}}+c$

Answer: A

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72. $\int \frac{x^3+2x}{x^4+4}dx =$

A. $\frac{1}{2}\left[\tan^{-1}\left(\frac{x^2}{2}\right)+\log\left(\frac{\sqrt{x^4+4}}{2}\right)\right]+C$

B. $\frac{1}{2}\tan^{-1}\left(\frac{x^2+2}{2x}\right)+C$

C. $\frac{1}{2}\left[\tan^{-1}\left(\frac{x^2}{2}\right)-\log\left(\frac{\sqrt{x^4+4}}{4}\right)\right]+C$

D. $\frac{1}{\sqrt{2}}\tan^{-1}\left(\frac{x^2+1}{\sqrt{2}x}\right)+C$

Answer: A

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73. Evaluate: $\int \frac{x+1}{x\left(1+x e^{x}\right)^{2}} d x$

A. $\log\left|\frac{1+xe^x}{x+1}\right| + C$

B. $\log\left|\frac{xe^x}{1+e^x}\right| + C$

C. $\log\left|\frac{(x+1)e^x}{1+e^x}\right| + C$

D. $\log\left|\frac{xe^x}{x+e^x}\right| + C$

Answer: B

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74. $\int \sec^5 x dx =$

A. $\frac{1}{4}\sec x\tan^3 x + \frac{5}{8}\sec x\tan x + \frac{3}{4}(\log\sec x + \tan x) + c$

B. $\frac{1}{4}\tan^3 x\sec x + \frac{5}{8}\sec x\tan x + \frac{3}{8}\log(\sec x + \tan x) + c$

C. $\frac{1}{4}\sec^2 x\tan x + \frac{3}{8}\sec x\tan x + \frac{3}{4}\log(\sec x + \tan x) + c$

D. $\frac{1}{4}\sec x\tan^3 x+\frac{11}{8}\sec x\tan x+\frac{3}{4}\log(\sec x+\tan x)+c$

Answer: B

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75. $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}}\cot^9 x dx=$

A. $\frac{-7}{42}+\frac{1}{2}\log 2$

B. $\frac{7}{24}-\frac{1}{2}\log 2$

C. $\frac{25}{24}+\frac{1}{2}\log 2$

D. $\frac{1}{24}+2\log 2$

Answer: A

View Text Solution

76. Let $f(x)$ be an even function with period 2 and $f(x)$ be integrable on every interval . If $g(x) = \int_0^x f(t)dt$, then $g(x+2) =$

A. $g(x)g(2)$

B. $g(x) + g(2)$

C. $g(x)$

D. $g(2)$

Answer: B

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77. Let $[x]$ be greatest integer function. Then, $\int_{-1}^{1} [x + 2[x + 2[x]]]dx =$

A. 0

B. -5

C. -7

D. 10

Answer: C

View Text Solution

78. If k and l respectively are the order and degree of the differential equation whose general solution represents the family of circles of constant radius, then $k^2 + l^2 =$

A. 2

B. 6

C. 8

D. 10

Answer: C

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79. The solution of the differential equation $\frac{dy}{dx} = 1 - \cos(y - x)\cot(y - x)$ is

A. $x \tan(y - x) = c$

B. $x = \tan(y - x) + c$

C. $x = \sec(y - x) + c$

D. $x + \sec(y + x) = c$

Answer: D

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80. The general solution of the differential equation $(y \sin x + y)\frac{dy}{dx} - \cos^2 x = 0$

A. $y^2 = x - \cos x + c$

B. $y = 1 + \sin x + c$

C. $y^2 = 2x - 2\sin x + c$

D. $y^2 = 2x + 2\cos x + c$

Answer: D

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81. If : R - $\left\{\frac{3}{7} \rightarrow R - \left\{\frac{3}{7}\right\}\right.$ is given by f(x) = $\frac{3x+5}{7x-3}$, then the statement which is not true, is

A. $f^{-1}(x) = f(x)$

B. (fof)(x) = x

C. (fofof)(x) = x

D. (fofofof)(x) = x

Answer: C

View Text Solution

82. If $f: A\overrightarrow{B}\, and g: B\overrightarrow{C}$ are onto functions show that gof is an onto function.

A. f is onto

B. g is onto

C. both f, g are onto

D. neither f nor g is onto

Answer: B

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83. The sum of first n terms of the series $\frac{3}{5} + \frac{21}{25} + \frac{117}{125} + \ldots.$ is

A. $n+\dfrac{2^{n+1}}{3\times 5^n}-\dfrac{2}{3}$

B. $n-\dfrac{2^{n+}}{3\times 5^n}-\dfrac{2}{3}$

C. $n+\dfrac{2^{n+1}}{3\times 5^n}+\dfrac{2}{3}$

D. $n-\dfrac{2^{n+1}}{3\times 5^n}+\dfrac{2}{3}$

Answer: A

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84. The sum of the values of x so that the matrix

$\begin{pmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{pmatrix}$ -x $\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$ is singular, is

A. 3

B. 5

C. 7

D. 9

Answer: C

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85. If $A = \begin{bmatrix} \cos\alpha & -\sin\alpha & 0 \\ \sin\alpha & \cos\alpha & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then A^{-1} is

A. A + I

B. A - I

C. A

D. $Adj(A^{-1})$

Answer: C

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86. If abc $\neq$ 0 and the system of equations

x + 7 ay + 2az = 0, x + 6 by + 2 bz = 0,

x + 5cy + 2cz = 0 has a non-zerotrivial solution, then a,b,c are in

A. harmonic progression

B. geometric progression

C. arithmetic progression

D. arithmetic-geometric progression

Answer: A

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87. z_1, z_2 are two complex numbers with $|z_1 - z_2| <$ k. If the complex number z satisfies the condition $|z_1 - z_2| + |z - z_2|$= k , then z lies on

A. a parabola

B. an ellipse

C. a circle

D. a hyperbola

Answer: B

View Text Solution

88. In the complex plane C, the set

$\left\{z \in C : arg\left(\frac{z-1}{z+1}\right) = \frac{\pi}{4}\right\}$ represents

A. a straight line

B. a circle

C. a parabola

D. an ellipse

Answer: B

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89. If $z_1 = a + ib$ and $z_2 + cid$ are complex numbers such that $|z_1| = |z_2| = 1$ and $Re(z_1 \bar{z}_2) = 0$,

then the pair of complex numbers $w_1 = a + ic$ and $w_2 = bid$ satisfies :

A. Re$(w_1)\overline{w_2}) = 0$

B. Re$(w_1)\overline{w_2}) = 1$

C. $|(w_1)| \neq |w_2|$

D. $|(w_1)| = |w_2| = 0$

Answer: A

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90. If $(1+x)^n = a_0 + a_1x + a_2x^2 + \ldots\ldots\ldots + a_nx^n$, then show that

(i) $a_0 - a_2 + a_4 - a_6 + \ldots\ldots\ldots = 2^{n/2}\cos.\frac{n\pi}{4}$

(ii) $a_1a_3 + a_5 - a_7 + \ldots\ldots\ldots = 2^{n/2}\sin.\frac{n\pi}{4}$

A. 2^n

B. 2^{2n}

C. $\frac{2^n}{2}$

D. $2^{\frac{n}{2}}$

Answer: D

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91. For x $>$ 2, then equation

$\sqrt{x+2} - \sqrt{x-2} = \sqrt{4x-2}$ has

A. one solution

B. two solutions

C. more than two solutions

D. no solution

Answer: D

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92. If x $\in$ R, then the range of $\dfrac{x}{x^2 - 5x + 9}$ is

A. $\left(-\dfrac{1}{11}, 1\right)$

B. $\left(-\infty, \dfrac{-1}{11}\right) \cup (1, \infty)$

C. $\left[\dfrac{-1}{11}, 1\right]$

D. $\left[-1, \dfrac{1}{11}\right]$

Answer: C

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93. If α, β, γ are the roots of the equation $x^3 - ax^2 + bx - c = 0$, then $\sum \alpha^2(\beta + \gamma) =$

A. ab - 3c

B. $\dfrac{ab - 3c}{c}$

C. $\dfrac{b^2 - 2ac}{c^2}$

D. $\dfrac{a^2 - 2b}{c^2}$

Answer: A

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94. The equation whose roots are reciprocals of the roots of $6x^6 - 25x^5 + 31x^4 - 31x^2$ + 25x - 6 = 0 ` is

A. 3

B. 3.5

C. $\frac{25}{6}$

D. 2.5

Answer: D

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95. The number of five digit numbers that are divisible by 6 which can be formed by choosing digits from {0, 1, 2, 3, 4, 5}, when repetition is allowed, is

A. 648

B. 540

C. 1296

D. 1080

Answer: D

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96. A person invites 8 guests to a dinner and places 5 of them at one table and the remaining 3 at another, both the tables being round. The number of ways in which the guests can be arranged is

A. 40320

B. 2688

C. 8064

D. 13440

Answer: B

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97. If 15^{k} divides 47! But 15^{k+1} does not divide it, then k =

A. 15

B. 12

C. 10

D. 5

Answer: C

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98. If $(1+x+x^{2})^{n}=c_{0}+c_{1}x+c_{2}x^{2}+\ldots.,$ then the value of $c_{0}c_{1}-c_{1}c_{2}+c_{2}c_{3}-\ldots\ldots$ is

A. $(-1)^{n}$

B. 0

C. 2^{n}

D. 3^n

Answer: B

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99. If x is so small that x^2 and higher powers of x can be neglected, then the approximate value of $\left(1+\frac{3}{4}x\right)^{\frac{1}{2}}\left(1-\frac{2x}{3}\right)^{-2}$ is

A. $\frac{41+24x}{41}$

B. $\frac{41-24x}{41}$

C. $\frac{24+41x}{24}$

D. $\frac{24-41x}{24}$

Answer: C

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100. If

$$\frac{x^4}{(x-a)(x-b)(x-c)} = P(x) + \frac{A}{x-a} + \frac{B}{x-b} + \frac{C}{x-c},$$ then

P(0) + A(a - b)(a - c) =

A. $a^4 + b^4 + c^4 + a$

B. a + b + c

C. $a^4 - a - b - c$

D. a + b + c + a^4

Answer: D

View Text Solution

101. If sinα = p , then the quadratic equation whose roots are tan $\frac{\alpha}{2}$, cot $\frac{\alpha}{2}$ is

A. $px^2 - 2x + p = 0$

B. $px^2 + 2x + p = 0$

C. $px^2 + x + p = 0$

D. $px^2 - x + p = 0$

Answer: A

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102. $\cos 66^\circ + \sin 84^\circ$ =

A. $\frac{1}{4}(\sqrt{3} + \sqrt{5})$

B. $\frac{1}{4}\sqrt{5}(\sqrt{3} + 1)$

C. $\frac{1}{4}(\sqrt{3} + 1)(\sqrt{5} + 1)$

D. $\frac{1}{4}\sqrt{3}(\sqrt{5} + 1)$

Answer: D

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103. If $\tan\theta + \tan 2\theta + \sqrt{3}\tan\theta\tan 2\theta = \sqrt{3}$ then $\theta =$

A. $(3n+1)\frac{\pi}{3}, n \in$ Z

B. $(3n+1)\frac{\pi}{9}, n \in$ Z

C. $(3n+1)\frac{\pi}{6}, n \in$ Z

D. $\frac{2n+1}{\pi}/(9), n \in$ Z

Answer: B

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104. Solve $\sin^{1}\frac{3x}{5} + \sin^{-1}\frac{4x}{5} = \sin^{-1}x$

A. 0

B. $\frac{1}{2}$

C. $\frac{1}{3}$

D. $\frac{1}{4}$

Answer: A

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105. If $\theta = \frac{\pi}{6}$ and $x = \log\left[\cot\left(\frac{\pi}{4} + \theta\right)\right]$, then sin h(x) =

A. $\sqrt{3}$

B. $\frac{1}{\sqrt{3}}$

C. $-\sqrt{3}$

D. $-\frac{1}{\sqrt{3}}$

Answer: C

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106. In Δ ABC, if the median AD drawn through A is perpendicular to the side AC, then 3ca cos A cos C $+2a^2$ =

A. c^2

B. $2c^2$

C. $3c^2$

D. $4c^2$

Answer: B

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107. If α, β, γ are the lengths of altitudes of ΔABC, then $\alpha^{-2} + \beta^{-2} + \gamma^{-2}$=

A. $\frac{4}{\Delta}$(tanA + tanB + tanC)

B. $\frac{1}{\Delta}$(cotA + cotB + cot C)

C. $\frac{\Delta^2}{2}(\tan A + \tan B + \tan C)$

D. $\frac{\Delta^2}{4}(\cot A + \cot B + \cot C)$

Answer: B

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108. If Δ ABC, $(r_2 + r_3)\cot\left(\frac{B+C}{2}\right)$ =

A. a + b + c

B. a

C. b

D. c

Answer: B

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109. If the vectors AB = $\hat{i} + 3\hat{j} + 4\hat{k}$, AC = 5 $\hat{i} + \hat{j} + 2\hat{k}$ are two sides of a triangle ABC, whose centroid is G, then |AG|=

A. $\frac{2}{3}\sqrt{22}$

B. $\sqrt{22}$

C. $\frac{1}{3}\sqrt{22}$

D. $\sqrt{18}$

Answer: A

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110. The point of intersection of the lines represented by

$r = \left(\hat{i} + 2\hat{j} - k\right) + \lambda\left[2\hat{i} + 3\hat{j} + 4\hat{k}\right]$ and

r = $\left(-\hat{i} - 3\hat{j} + 7\hat{k}\right) + \mu\left(\hat{i} + 2\hat{j} - \hat{k}\right)$ is

A. $3\hat{i} + 5\hat{j} + 3\hat{k}$

B. $5\hat{i} + 8\hat{j} + 7\hat{k}$

C. $-\hat{i} - \hat{j} - 5\hat{k}$

D. $-3\hat{i} - 4\hat{j} - 9\hat{k}$

Answer: A

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111. If A,B,C and D are points whose position vectors are $\hat{i} + \hat{j} + \hat{k}, 4\hat{i} - \hat{j} + 2\hat{k}, 5\hat{i} + \hat{j},$

$7\hat{i} + 2\hat{j} + 3\hat{k}$ respectively, then the projection of AB on CD is

A. $\dfrac{4}{3}$

B. $\sqrt{\dfrac{2}{7}}$

C. $\dfrac{3}{4}$

D. $\sqrt{\dfrac{7}{2}}$

Answer: D

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112. Let a and b be unit vectors with θ as the acute angle between them. If

$\frac{1}{2}$ | a - b | = sin $\lambda\theta$, then $4\lambda^2$ =

A. 4

B. 1

C. 3

D. 2

Answer: B

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113. Let a = $2\hat{i} - 3\hat{j} + 4\hat{k}, b = \hat{i} + 2\hat{j} - 2\hat{k}$ and $c = 3\hat{i} - \hat{j} + \hat{k}$. The valume (in cubic units of the parallelopiped having a + b + c, a - b + c and a + b -c as coterminus edges is

A. 6

B. 7

C. 28

D. 36

Answer: C

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114. If |a| = 1, |b| = 1,|c| = 2 and $a \times (a \times c) +$ b = 0 , then $(a.\, c)^2$

A. 1

B. 2

C. 4

D. 3

Answer: D

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115. The variance of the observations 2,3,5,7,11,13,17,22 is

A. 43,75

B. 48,25

C. 80

D. 350

Answer: A

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116. The coefficient of variation and standard deviation of an ungrouped data are 60 and 21 respectively. If 15 is added to every observation of the data, then the coefficient of variation of the new data is

A. 30

B. 42

C. 40

D. 20

Answer: B

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117. Each of the two boxes A and B contain 10 chits numbered 1 to 10. If one chit is drawn at random from each of A and B , then the probability that the number on the chit drawn from A is smaller than the number on the chit drawn from B, is

A. $\frac{9}{10}$

B. $\frac{9}{20}$

C. $\frac{19}{20}$

D. $\frac{17}{20}$

Answer: B

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118. A letter is known to have come either from LONDON or CLIFTON, on the postmark only the two consecutive letters ON are legible . The probability that is come from London is

A. $\frac{12}{17}$

B. $\frac{5}{17}$

C. $\frac{3}{17}$

D. $\frac{2}{5}$

Answer: A

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119. The probability function of a random variable X is given by P(X = k) = ck^2, where c is a constant and k $\in \{0, 1, 2, 3, 4\}$, If σ^2 is the variance of X and μ is the mean of X, then $\sin gma^2 + \mu^2$ =

A. 3.33

B. 11.8

C. $\frac{1}{30}$

D. 354

Answer: B

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120. In a book of 250 pages, there are 200 typographical errors. Assuming that the number of errors per page follow tha Poisson law, then the probability that random sample of 5 pages will contain no typographical error is

A. e^{-4}

B. $e^{-\frac{4}{5}}$

C. $e^{-\frac{16}{25}}$

D. e^{-1}

Answer: A

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121. The locus of a point P(x, y) satisfying the equation $\sqrt{(x-2)^2+y^2}+\sqrt{(x+2)^2+y^2}=4$, is

A. an ellipse

B. a parabola

C. a line segment

D. a circle

Answer: C

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122. If the origin is shifted to (2,3) and the axes are rotated through an angle 45° about that point, then the transformed equation of $2x^2+2y^2-8x-12y+18=0$ is

A. $x^2-7y^2-14xy-2=0$

B. $x^2 + y^2 = 4$

C. $x^2 - y^2 = 4$

D. $8x^2 - 2y^2 = 9$

Answer: B

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123. A line passing through P(4,2) cuts the coordinate axes at A and B respectively. If O Is the origin, then the locus of the centre of the circum-circle of ΔOAB is

A. $x^{-1} + y^{-1} = 2$

B. $2x^{-1} + y^{-1} = 1$

C. $x^{-1} + 2y^{-1} = 1$

D. $2x^{-1} + 3y^{-1} = 1$

Answer: B

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124. The centroid of the triangle formed by the lines x + y - 1 = 0, x - y - 1 = 0, x - 3y + 3 = 0 is

A. $\left(\frac{4}{3}, 1\right)$

B. $\left(\frac{-4}{3}, 1\right)$

C. $\left(\frac{8}{3}, 3\right)$

D. $\left(\frac{-8}{3}, 3\right)$

Answer: A

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125. Find the orthocentre of the triangle formed by the vertices (-2,-1), (6,-1),(2,5)

A. $x^2 - 5x + 6 = 0$

B. $2x^2 - 9x + 9 = 0$

C. $3x^2 - 8x + 4$= 0

D. $6x^2 - 13x + 6 = 0$

Answer: C

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126. The straight line x + y + 1 = 0 bisects an angle between the pair of lines of which one is 2x - 3y + 4 = 0. Then, the equation of the other line is

A. 2x + 3y + 4 = 0

B. x - y + 1 = 0

C. 5x - 5y + 9 =0

D. 3x - 2y + 5 = 0

Answer: D

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127. If the pairs of straight lines represented by $3x^2 + 2hxy - 3y^2 = 0$ and $3x^2 + 2hxy - 3y^2 + 2x - 4y + c = 0$ form a square, then (h, c) =

A. (4,-1)

B. (-1, 4)

C. (-4 ,1)

D. (1, -4)

Answer: A

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128. The equation of the bisectors of the angles between the lines joining the origin to the points of intersection of the curve $x^2 + xy + y^2 + x + 3y + 1 = 0$ and the line

x + y + 2 = 0 is

A. $x^2 + 4xy - y^2 = 0$

B. $2x^2 + 5xy - y^2 = 0$

C. $x^2 + 6xy - 2y^2 = 0$

D. $2x^2 - 4xy + 2y^2 = 0$

Answer: A

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129. Let A be the centre of the circle $x^2 + y^2 - 2x - 4y - 20 = 0.$ Suppose that the tangent at the points B(1,7) and D(4,-2) on the circle meet at the point C. The area of the quadrilateral ABCD is

A. 75

B. 64

C. 56

D. 45

Answer: A

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130. The point of concurrence of all conjugate lines of the line 5x + 7y - 78 = 0 with respect to the circle $x^2 + y^2 + 6x + 8y - 96 = 0$ is

A. (-2, 3)

B. (3, -2)

C. (3,2)

D. (2,3)

Answer: D

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131. The number of common tangent to the circles $x^2 + y^2 + 4x - 6y - 12 = 0$ and $x^2 + y^2 - 8x + 10y + 5 = 0$ is

A. 4

B. 3

C. 2

D. 1

Answer: C

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132. If the two circles $(x-1)^2+(y-3)^2=r^2$ and $x^2+y^2-8x+2y+8=0$ intersect at two distinct points, then

A. 2 $< r <$ 8

B. $1 < r < 9$

C. r = 2

D. r = 8

Answer: A

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133. If the circle $x^2+y^2+6x-2y+k=0$ bisects the circumference of the circle $x^2+y^2+2x-6y-15=0$, then k =

A. 21

B. -21

C. -23

D. 23

Answer: C

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134. Find the equation of the circle which cuts the following circles orthogonally.

$x^2 + y^2 + 4x - 7 = 0, 2x^2 + 2y^2 + 3x + 5y - 9 = 0, x^2 + y^2 + y = 0$

A. $x^2 + y^2 - 4x - 2y - 1 = 0$

B. $x^2 + y^2 - 4x - 6y - 3 = 0$

C. $x^2 + y^2 - 4x - 2y - 3 = 0$

D. $x^2 + y^2 - 2x - 4y - 1 = 0$

Answer: A

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135. The vertex and the focus of the parabola $2y^2 + 5x - 6y + 1 = 0$ respectively

A. $\left(\frac{7}{10}, \frac{3}{2}\right), \left(\frac{3}{40}, \frac{3}{2}\right)$

B. $\left(\frac{-7}{10}, \frac{3}{2}\right), \left(\frac{53}{40}, \frac{3}{2}\right)$

C. $\left(\frac{7}{10}, \frac{-3}{2}\right), \left(\frac{7}{10}, \frac{7}{8}\right)$

D. $\left(\frac{-7}{10}, \frac{-3}{2}\right), \left(\frac{7}{10}, \frac{17}{8}\right)$

Answer: A

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136. If a normal chord at a poit t($\neq$ 0) on the parabola y^2 = 9x subtends a right angle at its vertex, then t =

A. $\sqrt{3}$

B. $\sqrt{5}$

C. $\pm\sqrt{3}$

D. $\pm\sqrt{2}$

Answer: D

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137. The major and minor axes of an ellipse are along the X -axis and Y -axis respectively. If its latusrectum is of length 4 and the distance between the foci is $4\sqrt{2}$, then the equation of that ellipse is

A. $2x^2 + y^2 = 16$

B. $x^2 + 2y^2 = 16$

C. $\frac{x^2}{2} + \frac{y^2}{3} = 1$

D. $\frac{x^2}{3} + \frac{y^2}{2} = 1$

Answer: B

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138. If c $\in$ R be such that the line 4x - y + c = 0 touches the ellipse $x^2 + 4y^2 = 4$, then an equation having all such values of c among its roots is

A. $x^2 - (1 + \sqrt{7}x + \sqrt{17} = 0$

B. $x^2 - (1 - \sqrt{17})x - \sqrt{17} = 0$

C. $x^3 - x^2 - 17x + 17 = 0$

D. $x^3 - x^2 + 17x - 17 = 0$

Answer: C

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139. If e_1, e_2 are respectively the eccentricities of the curves 9 $x^2 - 16y^2 - 144 = 0$ and $9x^2 - 16y^2 + 144 = 0$ then $\frac{e_1^2 e_2^2}{e_1^2 + e_2^2}$=

A. $\sqrt{2}$

B. 1

C. $\sqrt{3}$

D. 2

Answer: B

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140. If A(2, 4, -1), B(3, 6, -1) and C(4, 5, 1) are three consecutive vertices of a parallelogram, then its fourth vertex is

A. (1,3,3)

B. (1,3,-3)

C. (3,3,-1)

D. (3,3,1)

Answer: D

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141. If the line joining the points A(2,3, -1) and B(3, 5, -3) is perpendicular to the line joining C(1,2,3)and D(3, y, 7), then y =

A. 1

B. 3

C. 5

D. 7

Answer: C

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142. A plane is making intercepts 2,3,4 on X, Y and ,Z-axes respectively. Another plane is passing through the point (-1,6,2) and is perpendicular to the line joining the points (1,2,3) and (-2,3,4). Then angle between the two planes is

A. 90°

B. $\cos^{-1}\sqrt{\frac{12}{61}}$

C. $\cos^{-1}\sqrt{\frac{11}{61}}$

D. $\cos^{-1}\sqrt{\frac{5}{6}}$

Answer: C

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143. If $\alpha, \; = \lim_{x \to 0} \frac{x.2^x - x}{1 - \cos x}$ and

A. $\alpha = \beta$

B. $2\alpha = \beta$

C. $\alpha = 2\beta$

D. $\alpha = 3\beta$

Answer: C

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144. If f (x) = $\begin{cases} \frac{X-|X|}{X} & \text{when x} < o \\ 5x^2+a & \text{when} 0 \le x \le 1 \\ b\left(\frac{x^2-1}{x^2-3x+2}\right) & \text{when} 1 < x < 3 \\ -14 & \text{when x} \ge 3 \end{cases}$

is a continuous function on R, then (a, b) =

A. $\left(2, \frac{7}{2}\right)$

B. (2, -14)

C. $\left(-\frac{7}{2}, -14\right)$

D. (2, 7)

Answer: A

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145. The number of points in the interval (0,2) at which f(x) = |x - 0.5 | + |x -1 | + tan x is not differentiable is

A. 1

B. 2

C. 3

D. 4

Answer: C

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146. If x = secθ - cosθ, y = $\sec^{10}\theta - \cos^{10}\theta$ and $(x^2+4)\left(\frac{dy}{dx}\right)^2 = k(y^2+4)$, then k =

A. $\frac{1}{100}$

B. 1

C. 10

D. 100

Answer: D

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147. If y = $e^{\sin^{-1}x}$, then $(1-x^2)y_2 - xy_1$ =

A. 0

B. 1

C. y

D. 2y

Answer: C

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148. The semivertical angle of a cone is 45°. If the height of the cone is 20.025 cm, then the approximate value of its lateral surface area (in sq. cm) is

A. $401\sqrt{2}\pi$

B. $400\sqrt{2}\pi$

C. $402\sqrt{2}\pi$

D. $405\sqrt{2}\pi$

Answer: A

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149. The radius of sphere increases at the rate of 0.04 cm/sec. the rate of increase in the volume of that sphere with respect to its surface area, when its radius is 10 cm is

A. 16π

B. 25

C. 20

D. 5

Answer: D

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150. If f(x) = a log |x| + bx^2 + x has extreme values at x = -1 and x = 2 , then the ordered pair (a,b) =

A. (2, -1)

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

C. $(-1, 2)$

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

Answer: B

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151. If f(x) = $x^3 + px^2 + qx$ is defined on [0,2] such that f(0) = f(2) and f' $\left(1 + \frac{1}{\sqrt{3}}\right) = 0$, then $p^2 + q^2$ =

A. 13

B. 5

C. $2 + \frac{1}{\sqrt{3}}$

D. 1

Answer: A

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152. If x $\in \frac{-3}{\sqrt{2}}$, then $\int \frac{x^2}{2x^2 + 6\sqrt{2}x + 9}$ dx =

A. $\frac{1}{2\sqrt{2}}\left[\left(\sqrt{2}x + 3\right) - 6\log\left|\sqrt{2}x + 3\right| - \frac{9}{\sqrt{2} + 3}\right]$ + c

B. $\frac{1}{2\sqrt{2}}\left[\sqrt{2x} + 3 - 6\log\left|\left(\sqrt{2}x + 3\right)\right| + \frac{9}{\sqrt{2x} + 3}\right]$ + c

C. $\sqrt{2}x + 3 - 6\log\left(\sqrt{2}x + 3\right) + c$

D. $\log\left(2x^2 + 6\sqrt{2}x + 9\right) + c$

Answer: A

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153. $\int \frac{\sqrt{1-x^2}\sin^{-1}x + x}{\sqrt{1-x^2}}$ dx =

A. $x\sin^{-1}x + \sqrt{1-x^2} + c$

B. $\sin^{-1}x + \sqrt{1-x} + c$

C. $x\sin^{-1}x +$ c

D. $\frac{x\sin^{-1}x}{\sqrt{1-x^2} + c}$

Answer: C

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154. If $\int x^2 c^{2x} dx = \frac{e^2}{8}$ f(x) + c, then the sum of all the complex roots of f(x) = 1 is

A. $\frac{1}{2}$

B. 3

C. 1

D. 2

Answer: A

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155. $\int \sin^5 x . \cos^5 x dx =$

A. $\frac{\cos^6 x}{60}\left(6\sin^4 x + 3\sin^2 x + 1\right) + c$

B. $-\frac{\sin^6 x}{60}\left(6\cos x + 3\cos^2 x + 1\right) + c$

C. $-\frac{\cos^6 x}{60}\left(6\sin^4 x + 3\sin^2 x + 1\right) + c$

D. $\dfrac{\sin^6 x}{60}\left(6\cos^4 x + 3\cos^2 x + 1\right) + c$

Answer: C

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156.

$$\lim_{n \to \infty}\left[\frac{1}{n} + \frac{n^2}{(n+1)^3} + \frac{n^2}{(n+2)^3} + \frac{n^2}{(n+3)^3} + \ldots.. + \frac{1}{125n}\right] =$$

A. $\dfrac{3}{8}$

B. $\dfrac{15}{32}$

C. $\dfrac{12}{25}$

D. $\dfrac{35}{72}$

Answer: C

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157. $\int_{e^{-1}}^{e^2}\left|\frac{\log x}{x}\right|dx =$

A. $\frac{2}{5}$

B. 2

C. 5

D. $\frac{5}{2}$

Answer: D

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158. The area (in square units) bounded by y = $\tan^{-1}$ x, y = $\cot^{-1}$ x and the Y- axis, is

A. $\log_e 4$

B. $\log_e 2$

C. $\log_e 3$

D. $\log_e 5$

Answer: B

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159. The order of the differential equation corresponding to the family of parabolas whose axes are along the X-axis and whose foci are at the origin, is

A. 4

B. 3

C. 2

D. 1

Answer: D

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160. The general solution of the differential equation yy' = $x\left[\frac{y^2}{x^2}+\frac{\phi\left(\frac{y^2}{x^2}\right)}{\phi'\left(\frac{y^2}{x^2}\right)}\right]$, where ϕ is an arbitrary function, is

A. $x\phi\left(\frac{y^2}{x^2}\right)$ = cy

B. $x^2\phi\left(\frac{y^2}{x^2}\right)$ = c

C. $x^2\phi\left(\frac{y^2}{x^2}\right)=cy^2$

D. $\phi\left(\frac{y^2}{x^2}\right)=cx^2$

Answer: D

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161. Match the following

List I		List II
(A) $f : R \to R$ is such that $f(x) = px + q$, $(p \neq 0)$, $\forall\ x \in R$	I.	f is neither one-one nor onto
(B) $f : R \to R^+ \cup \{0\}$ is such that $f(x) = x^2$, $\forall\ x \in R$	II.	f is both one-one and onto
(C) $f : N \to N$ is such that $f(n) = n^2 + 2n + 3, \forall\ n \in N$	III.	f is one-one but not onto
(D) $f : R \to R$ is such that $f(x) = 2\ (\cos^2 5x + \sin^2 5x)$, $\forall\ x \in R$	IV.	f is onto but not one-one
	V.	f is a constant function and also a bijection

The correct answer is

A. A-II, B-IV, C - III, D - I

B. A-II, B-IV, C-V, D-I

C. A-II, B-I, C -III, D - V

D. A-III, B-II, C-I, D - IV

Answer: A

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162. The range of $f(x) = \sqrt{\dfrac{a-|x|}{(a+1)-|x|}}, (a>0)$ is

A. [0, a]

B. $[0, \infty) - \left[-\sqrt{\dfrac{a}{a+1}}, \sqrt{\dfrac{a}{a+1}}\right]$

C. $\left[0, \sqrt{\dfrac{a}{a+1}}\right] \cup (1, \infty),$

D. $\left[0, \sqrt{\dfrac{a}{a+1}} + 1\right]$

Answer: C

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163. If $2.4^{2k+1} + 3^{3k+1} = 11t$ and $2.4^{2k+3} + 3^{3k+4} = 11(pt + 3^q)$, where $k, t \in Z^+$, then (p, q) =

A. (16, 3k +1)

B. (16, 3k + 4)

C. (32, 3k +1)

D. (32, 3k + 4)

Answer: A

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164. The equation obtained by eliminating a, b, c from the equations

$x = \frac{a}{b-c}, y = \frac{b}{c-a}, z = \frac{c}{a-b}$ is

A. $\begin{vmatrix} 1 & -x & x \\ 1 & -y & y \\ 1 & -z & z \end{vmatrix} = 0$

B. $\begin{vmatrix} 1 & -x & x \\ 1 & 1 & -y \\ 1 & z & 1 \end{vmatrix} = 0$

C. $\begin{vmatrix} 1 & -x & x \\ y & 1 & -y \\ -z & z & -1 \end{vmatrix} = 0$

D. $\begin{vmatrix} x & y & 1 \\ y & x & 1 \\ 1 & x & y \end{vmatrix} = 0$

Answer: B

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165. If A is a 3×3 matrix and $|A| = 2$, then $|Adj(AdjA)|Adj(AdjA)$ =

A. $32A$

B. $64A$

C. $16A$

D. $8A$

Answer: A

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166. If $x=\alpha, y=\beta, z=\gamma$ is the solution, for the system of equations

$2x-y+8z=13$

$3x+4y+5z=18$

$5x-2y+7z=20$

then $\alpha\beta+\beta\gamma+\gamma\alpha=$

A. 1

B. 0

C. 7

D. -3

Answer: C

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167. For a complex number Z = a ib, let $\widehat{Z} = b + ia$. If Z_1, Z_2 are such complex numbers, then $\widehat{Z_1 Z_2}$ =

A. $\widehat{Z}_1 \widehat{Z}_2$

B. $\widehat{Z}_1 \widehat{\overline{Z}}_2$

C. $\overline{Z}_1 \widehat{Z}_2$

D. $\widehat{Z}_1 Z_2$

Answer: C

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168. The points in the argand plane represented by the complex conjugates of

$1 + 2i, 2 - 3i, 3 - 4i$

A. are collinear

B. form an equilateral triangle

C. form an obtuse angled triangle

D. form an acute angled triangle

Answer: C

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169. If $1, \alpha_1, \alpha_2, \ldots\ldots \alpha_{n-1}$ are the n^{th} roots of unity and n is an odd natural number then

$(1+\alpha_1)(1+\alpha_2)\ldots\ldots(1+\alpha_{n-1}) =$

A. 1

B. -1

C. 0

D. 2

Answer: C

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170. If $x+\frac{1}{x}=2\sin\alpha$ and $y+\frac{1}{y}=2\cos\beta$, then $x^3y^3+\frac{1}{x^3y^3}=$

A. $2\cos 3(\beta-\alpha)$

B. $2\cos 3(\beta+\alpha)$

C. $2\sin 3(\beta-\alpha)$

D. $2\sin 3(\beta+\alpha)$

Answer: C

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171. IF the product of the roots of the equation $x^2+4kx+12e^{3\log k}-I=0, (K>0)$ is 323, then the sum of its roots is

A. 9k

B. 12

C. -12

D. $-16k$

Answer: C

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172. If a and b are the maximum and minimum values of the quadratic expressions $1-2x-5x^2$ and x^2-2x+5 respectively, then the set of all values of x for which the expression $5ax^2+bx+7$ is positive, is

A. (a, b)

B. $(-\infty, 7)$

C. $(5, \infty)$

D. $(-\infty, \infty)$

Answer: D

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173. If $\left|\dfrac{x^2+kx+1}{x^2+x+1}\right| < 3$ for real x, then k is in the interval

A. (0, 4)

B. (-1, 5)

C. (-4, 0)

D. (-5, 1)

Answer: B

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174. Let $a, b, c, d \in R$. If the equations $2bx^2 + 3cx - d = 0$ and $2ax^2 + 3bx + 4c = 0$ have a common root and $\frac{4bc + ad}{k(b^2 - ac)} = \frac{bd + 4c^2}{4bc + ad}$, then k =

A. $\frac{9}{2}$

B. $\frac{2}{9}$

C. $\frac{1}{9}$

D. $\frac{1}{3}$

Answer: A

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175. If all the letters of the word REPEAT are permuted in all possible ways and if the six letter permutations thus formed are arranged in the dictionary order, then the rank of the word REPEAT is

A. 133

B. 267

C. 266

D. 132

Answer: B

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176. 15 persons are sitting around circular table. The number of ways of selectring three persons at a time from them, such that the selected three did not sit together at one place is

A. 455

B. 15

C. 45

D. 440

Answer: D

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177. If the coefficients of rth and (r+1)th terms in the expansion of $(1+x)^{24}$ are in the ratio 12 : 13, then r is the root of the quadratic equation

A. $x^2-5x+6=0$

B. $x^2-11x+30=0$

C. $x^2-14x+13=0$

D. $x^2-14x+24=0$

Answer: D

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178. If $x = \frac{2}{5} + \frac{1.3}{2!}\left(\frac{2}{5}\right)^2 + \frac{1.3.5}{3!}\left(\frac{2}{5}\right)^3 + \ldots$, then $x + \frac{1}{x} =$

A. $\frac{1+\sqrt{5}}{4}$

B. 3

C. $\frac{5\sqrt{5}+3}{4}$

D. $\frac{5\sqrt{5}-3}{4}$

Answer: D

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179. The coefficient of x^4 in the expansion of $\frac{1}{(1-x)(1-2x)(1-3x)}$ is

A. 602

B. 301

C. $\frac{601}{2}$

D. 302

Answer: B

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180. If tan A - tan B = x and cot A - cot B = y, then cot(A- B) =

A. $\frac{xy}{x+y}$

B. $\frac{xy}{x-y}$

C. $\frac{x-y}{xy}$

D. $\frac{y-x}{xy}$

Answer: D

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181. $\tan\frac{\pi}{5}+2\tan\frac{2\pi}{5}+4\cot\frac{4\pi}{5}=$

A. $\cot.\ \frac{\pi}{5}$

B. $\cot.\ \frac{2\pi}{5}$

C. $\cot.\ \frac{3\pi}{5}$

D. $\cot.\ \frac{4\pi}{5}$

Answer: A

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182. If $\sin x+\sin y=\frac{\sqrt{3}+1}{2}$ and $\cos x+\cos y=\frac{\sqrt{3}-1}{2}$, then $\tan^2\left(\frac{x-y}{2}\right)+\tan^2\left(\frac{x+y}{2}\right)=$

A. $8+4\sqrt{3}$

B. $6+4\sqrt{3}$

C. $3+\sqrt{3}$

D. $12+6\sqrt{3}$

Answer: A

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183. The pair of lines $lx^2+2(l+m)xy+my^2=0$ lies along two diameters of a circle and divides the circle into 4 sectors. If the area of bigger sector is 5 times the area of smaller sector, then $\frac{lm}{(l+m)^2}=$

A. $\frac{1}{2}$

B. $\frac{2}{\sqrt{3}}$

C. $\frac{11}{12}$

D. $\frac{13}{12}$

Answer: C

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184. The line 3x + 4y - 5 = 0 cuts the curve $2x^2 + 3y^2 = 5$ at A and B. if 'O' is the origin, then $\angle AOB$ =

A. $\frac{\pi}{6}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{2}$

D. $\frac{\pi}{8}$

Answer: C

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185. The centre of the circle which passes through the vertices of the triangle formed by the lines $y = 0$, $y = x$ and $2x + 3y = 10$, is

A. $\left(-\frac{5}{2}, -\frac{1}{2}\right)$

B. $\left(\frac{5}{2}, -\frac{1}{2}\right)$

C. $\left(-\frac{1}{2}, -\frac{1}{2}\right)$

D. $\left(\frac{5}{2}, -\frac{1}{2}\right)$

Answer: B

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186. Find the polar of the point (−2,3) with respect to the circle x2+y2−4x−6y+5=0

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187. A circle S of radius 2 units lies in the first quadrant and touches both the coordinate axes. The equation of the circle with centre at (6, 5) and touching the circle S externally is

A. $x^2 + y^2 - 12x - 10y + 12 = 0$

B. $x^2 + y^2 - 12x - 10y - 12 = 0$

C. $x^2 + y^2 - 12x - 10y + 25 = 0$

D. $x^2 + y^2 - 12x - 10y + 52 = 0$

Answer: D

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188. If the circles $(x+a)^2 + (y+b)^2 = a^2$ and $(x+c)^2 + (y+d)^2 = d^2$ cut orthogonally, then b(b-2d) =

A. c(c - 2a)

B. c(2a - c)

C. d(2c - a)

D. a(a-2c)

Answer: B

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189. The equation of the circle having the common chord of the circles $x^2 + y^2 - 8x = 0$ and $x^2 + y^2 - 9 = 0$ as its diameter is

A. $x^2 + y^2 - 72x - 207 = 0$

B. $x^2 + y^2 + 72x + 207 = 0$

C. $32x^2 + 32y^2 - 72x - 207 = 0$

D. $32x^2 + 32y^2 + 72x - 207 = 0$

Answer: C

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190. The parametric equations of the parabola $y^2 - 8x - 4y - 12 = 0$ are

A. $x = 2 + 2t^2, y = -2 + 4t$

B. $x = 2 + 4t, y = -2 + 2t^2$

C. $x = -2 + 2t^2, y = 2 + 4t$

D. $x = -2 + 4t, y = -2 + 2t^2$

Answer: C

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191. For any non-zero real value of m, the equation of the parabola to which the line $mx - y + 10 + m^2 = 0$ is a tangent, is

A. $x^2 = y - 10$

B. $y^2 = 4(x - 2)$

C. $x^2 = -4(y-10)$

D. $x^2 = -4y$

Answer: C

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192. The ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1(b > a)$ and the parabola $y^2 = 4ax$ cut at right angles. If e is the eccentricity of the ellipse, then $2e^2$ =

A. A 1

B. B $\frac{1}{2}$

C. C $\frac{1}{8}$

D. D $\frac{1}{3}$

Answer: A

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193. Angle between the tangents drawn from the point (5,4) to the ellipse $\frac{x^2}{25} + \frac{y^2}{16} = 1$ is

A. (5, 4)

B. (4, 5)

C. (0, 0)

D. (0, 5)

Answer: C

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194. If the normals drawn to the hyperbola xy = 4 at $(\alpha_i, \beta_i)(i = 1, 2, 3, 4)$ are concurrent at the point (a, b), then

$$\frac{(\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4)}{(\beta_1 + \beta_2 + \beta_3 + \beta_4)}(\alpha_1\alpha_2\alpha_3\alpha_4) =$$

A. $\frac{-16b}{a}$

B. $\frac{-16a}{b}$

C. $\frac{4b}{a}$

D. $\frac{4a}{b}$

Answer: B

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195. The distance between the circumcentre and the orthocentre of the triangle formed by (1,2,3),(3,-1,5),(4,0,-3) is

A. $\sqrt{\frac{33}{2}}$

B. $\sqrt{\frac{31}{2}}$

C. $\sqrt{\frac{27}{2}}$

D. $\sqrt{\frac{23}{2}}$

Answer: A

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196. The direction cosines of the normal drawn to the plane passing through the points (2, -1, 5), (1, -3, 4), (5, 2, 1) are

A. $\frac{11}{\sqrt{179}}, \frac{-7}{\sqrt{179}}, \frac{3}{\sqrt{179}}$

B. $\frac{9}{\sqrt{134}}, \frac{-7}{\sqrt{134}}, \frac{2}{\sqrt{134}}$

C. $\frac{11}{\sqrt{179}}, \frac{7}{\sqrt{179}}, \frac{-3}{\sqrt{179}}$

D. $\frac{9}{\sqrt{134}}, \frac{-7}{\sqrt{134}}, \frac{-2}{\sqrt{134}}$

Answer: A

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197. The equation of the plane π through the line of intersection of the planes $\pi_1 \equiv x + 3y - 6 = 0$ and $\pi_2 \equiv 3x - y + 4z = 0$ is $\pi_1 + \lambda\pi_2 = 0$. If the plane π is at unit distance from the origin, then an equation of the plane π is

A. $2x + y + 2z - 3 = 0$

B. $2x - y - 2z + 3 = 0$

C. $2x + y + 2z + 3 = 0$

D. $x + 2y + 2z + 3 = 0$

Answer: A

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198. Let [x] denote the greatest integer not exceeding x. If $l_1 = \lim_{x \to 2^+} \left(x^2 + [x]\right), l_2 = \lim_{x \to 2^+} (2x - [x])$ and

$l_3 = \lim_{x \to \frac{\pi}{2}} \left(\frac{\cos x}{x - \frac{\pi}{2}} \right)$, then

A. $l_2 < l_3 < l_1$

B. $l_1 < l_3 < l_2$

C. $l_1 < l_2 < l_3$

D. $l_3 < l_2 < l_1$

Answer: D

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199. If $\lim_{x \to 0} \frac{[(a-n)nx - \tan x]\sin nx}{x^2} = 0, (n \neq 0)$ then the minimum possible positive value of a is

A. 0

B. -2

C. 2

D. 1

Answer: C

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200. If a function f is defined by :

f(x) = 0, when x = 1,

$= x^3 - 1$, when $1 < x < \infty, \; = x - 1$, when $-\infty < x < 1$, then at

x = 1, f is

A. continuous and differentiable

B. continuous but not differentiable

C. discontinuous and differentiable

D. discontinuous and not differentiable

Answer: B

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201. If $\cos(f(x)) = \frac{1-x^2}{1+x^2}$ and $\tan(g(x)) = \frac{3x - x^3}{1-3x^2}$, then $\frac{df}{dg}$ =

A. $\frac{3}{2}$

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

C. $\frac{2}{3}$

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

Answer: C

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202. If $x^2 + y^2 = t - \frac{1}{t}$ and $x^4 + y^4 = t^2 + \frac{1}{t^2}$, then $\frac{dy}{dx}$ =

A. $\frac{2}{x^3}$

B. $\frac{2}{x^3 y}$

C. $\dfrac{1}{x^3}$

D. $\dfrac{1}{x^3 y}$

Answer: D

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203. If $x = \sin\theta$ and $y = \cos p\theta$, then $(1 - x^2)y_2 =$

A. $xy_1 - p^2 y$

B. $p^2 y - xy_1$

C. xy_1

D. $p^2 y$

Answer: A

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204. If T is the length of the subtangent drawn at any point on the curve $3y^2 = 4x^3$ and N is the length of the subnormal at the same point, the $(3T)^2$ =

A. $4N^2$

B. 4N

C. 2N

D. $8N^2$

Answer: C

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205. The interval in which the function $f(x) = \dfrac{\log(7+x)}{\log(3+x)}(x > 0)$ decreases is

A. $\left(0, \dfrac{7}{3}\right)$

B. $\left(0, \frac{3}{7}\right)$

C. (0, 1)

D. $(0, \infty)$

Answer: D

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206. Let f be a polynormal function defined on [2, 7]. If f(2) = 3 and $f'(x) = \leq 5$ for all x in (2, 7), then the maximum possible value attained by f at x = 7 is

A. 7

B. 14

C. 18

D. 28

Answer: D

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207. In the interval [-2, 4], the absolute maximum of $f(x) = 2x^3 - 3x^2 - 12x + 5$ occurs x =

A. A 4

B. B -2

C. C -1

D. D 2

Answer: A

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208. If $\int \frac{\cos 4x + 1}{\cot x - \tan x} dx = k \cos 4x + c$, then k is

A. $-\frac{1}{2}$

B. $-\frac{1}{4}$

C. $-\frac{1}{8}$

D. -1

Answer: C

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209. $\int e^{2x}\left[\cos(3x+4)+5x^2\right]dx =$

A. $e^{2x}\left[\frac{2}{13}\cos(3x+4)+\frac{3}{13}\sin(3x+4)+\frac{5x^2}{2}-\frac{5x}{2}+\frac{5}{4}\right]$

B. $e^{2x}\left[\frac{2}{13}\cos(3x+4)-\frac{3}{13}\sin(3x+4)+\frac{5x^2}{2}-\frac{5x}{2}+\frac{5}{4}\right]$

C. $e^{2x}\left[\frac{2}{13}\cos(3x+4)-\frac{3}{13}\sin(3x+4)-\frac{5x^2}{2}-\frac{5x}{2}-\frac{5}{4}\right]$

D. $e^{2x}\left[\frac{2}{13}\cos(3x+4)-\frac{3}{13}\sin(3x+4)+\frac{5x^2}{2}-\frac{5x}{2}+\frac{5}{4}\right]$

Answer: A

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210.

$$\int \frac{5\cot x+1}{(\cot x-1)(\cot x-2)\sin^2 x}dx = 6\log|f(x)|+11\log|g(x)|+c,$$

then (f(x), g(x)) =

A. $(\cot, x-1), (\cot x-2)^{-1})$

B. $((\cot x-1)^{-1}, \cot x-2)$

C. $((\cot x-1)^{-1}, (\cot x-2)^{-1})$

D. $(\cot x-1, \cot x+2)$

Answer: A

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211. If $I_{mc} = \int e^{mx}.\ X^n dx$, then $I_{mn}+\frac{n}{m}I_{m,n-1} =$

A. $x^n . e^{mx} + c$

B. $\frac{X^n e^{mx}}{n} + C$

C. $\frac{X^n . e^{mx}}{m} + C$

D. $\frac{-X^n . e^{mx}}{m} + C$

Answer: C

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212. $\lim_{n \to \infty} \frac{1}{n}[(n+1)(n+2)\ldots(2n)]^{\frac{1}{n}} =$

A. 1

B. 0

C. $\frac{2}{e}$

D. $\frac{4}{e}$

Answer: D

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213. $\int_0^{\frac{\pi}{2}} \frac{\sin^2 x}{\sin x + \cos x} dx =$

A. $\frac{3}{\sqrt{2}} \log\left(\sqrt{2}+1\right)^{\frac{1}{2}}$

B. $\frac{1}{\sqrt{2}} \log\left(\sqrt{2}+1\right)$

C. $\frac{\sqrt{2}}{3} \log\left(\sqrt{3}+1\right)$

D. $\frac{\sqrt{2}}{3} \log\left(\sqrt{2}-1\right)$

Answer: B

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214. The area (in sq units) enclosed by the loop of the curve $ay^2 = x^2(a-x), (a<0)$ is

A. $2\pi a^2$

B. $\frac{\pi}{3}a^2$

C. $\frac{4}{15}a^2$

D. $\frac{8}{15}a^2$

Answer: D

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215. The different equation corresponding to the finally of curves $y=e^x(A\cos x+B\sin x)$ is

A. $y'' + y' + y = 0$

B. $y'' + 2y' + 2y = 0$

C. $y'' - 2y' + 2y = 0$

D. $y'' - 2y' - 2y = 0$

Answer: C

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216. The solution of the differential equation $x\frac{dy}{dx}=y-x\tan\left(\frac{y}{x}\right)$ is (Here, k is an arbitrary constant)

A. $x=y\sin^{-1}\left(\frac{k}{x}\right)$

B. $y=x\sin^{-1}\left(\frac{k}{x}\right)$

C. $x\sin y+k=0$

D. $y=x\cos(kx)$

Answer: B

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