MATHS

BOOKS - TS EAMCET PREVIOUS YEAR PAPERS

AP EAMCET ENGINEERING ENTRANCE EXAM

Mathematics

1. In $\Delta ABC, \quad \text{if} \quad b \cos\theta = c - a$ (where θ is an acute angle) , then (c - a) tan $\theta =$

A. $2\sqrt{ca}\cos\frac{B}{2}$

B. $2\sqrt{ca}\sin\frac{B}{2}$

C. $2ca\cos\frac{B}{2}$

D. $2ca\sin\frac{B}{2}$

Answer: B

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2. Given below. Is the distribution of a random variable X

$X = x$	1	2	3	4
p(X=x)	λ	2λ	3λ	4λ

If $\alpha = P(X < 3)$ and $\beta = P(X > 2)$, then $\alpha : \beta =$

A. $2 : 5$

B. $3 : 4$

C. $4 : 5$

D. $3 : 7$

Answer: D

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3. If $f: IR \to IR$ is defined by

$$f(x) = \begin{cases} \text{x - 1}, & \text{for } x \leq 1 \\ 2 - x^2, & \text{for } 1 < x \leq 3 \\ \text{X - 10}, & \text{for } 3 < x < 5 \\ \text{2x}, & \text{for } x \geq 5 \end{cases}$$

then the set points of discontinuity of f is

A. IR - {1,5}

B. {1,3,5}

C. {1,5}

D. IR - {1,3,5}

Answer: C

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4. If the pair of lines $x^2 - 16pxy - y^2 = 0$ and $x^2 - 16qxy - y^2 = 0$ are such that each pair bisects the angle between the other pair, then qp =

A. $\frac{-1}{64}$

B. $\frac{1}{64}$

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

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

Answer: A

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5. If a non-zero vector a is parallel to the line of intersection of the plane determined by the vectors $\hat{j}-\hat{k}, 3\hat{j}-2\hat{k}$ and the plane determined by the vectors $2\hat{i}+3\hat{j}, \hat{i}-3\hat{j}$, then the angle between the vectors a and $\hat{i}+\hat{j}+\hat{k}$ is

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

B. $\cos^{-1}\left(\pm\frac{2}{\sqrt{3}}\right)$

C. $\tan^{-1}\sqrt{3}$

D. $\cos^{-1}\left(\pm\frac{1}{\sqrt{3}}\right)$

Answer: D

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6. If three number are drawn at random successively without replacement from a set S = {1, 2, ... 10}, then the probability that the minimum of the chosen number is 3 or their maximum is 7 .

A. $\frac{11}{40}$

B. $\frac{5}{40}$

C. $\frac{3}{40}$

D. $\frac{1}{40}$

Answer: A

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7. for $x^2 - 4 \neq 0$, the value of

$$\frac{d}{dx}\left[\log\left\{e^x\left(\frac{x-2}{x+2}\right)^{3/4}\right\}\right] at x = 3 is$$

A. $\frac{8}{5}$

B. 2

C. 1

D. $\frac{8e^3}{5}$

Answer: A

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8. If $y = \frac{\sinh^{-1} x}{\sqrt{1+x^2}}$ then $(1+x^2)y_2 + 3xy_1 + y =$

A. 2

B. 1

C. -1

D. 0

Answer: D

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9. The area enclosed between the curves $y^2 = x$ and $y = |x|$ is

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

B. $\frac{1}{6}$

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

D. 1

Answer: C

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10. $\int \frac{5x^2 + 3}{x^2(x^2 - 2)} dx =$

A. $\frac{13}{2\sqrt{2}} \log \left| \frac{\sqrt{2} - x}{\sqrt{2} + x} \right| + \frac{3}{2x} + C$

B. $\frac{13}{4\sqrt{2}}\log\left|\frac{x+\sqrt{2}}{x-\sqrt{2}}\right|+\frac{3}{2x}+C$

C. $\frac{13}{4\sqrt{2}}\log\left|\frac{x-\sqrt{2}}{x+\sqrt{2}}\right|+\frac{3}{2x}+C$

D. $\frac{5}{3\sqrt{2}}\log\left|\frac{x+2\sqrt{2}}{x-\sqrt{2}}\right|+\frac{3}{5}x+C$

Answer: C

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11. If $y=\tan^{-1}\left\{\frac{x}{1+\sqrt{1-x^2}}\right\}$ $+\sin\left\{2\tan^{-1}\sqrt{\frac{1-x}{1+x}}\right\}$, then $\frac{dy}{dx}=$

A. $\frac{1-2x}{2\sqrt{1-x^2}}$

B. $\frac{1-2x}{x\sqrt{1-x^2}}$

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

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

Answer: A

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12. The equation of the plane through (4, 4, 0) and perpendicular to the planes

2x + y + 2z + 3 = 0 and 3x + 3y + 2z - 8 = 0

A. 4x + 3y + 3z = 28

B. 4x - 2y - 3z = 8

C. 4x + 2y + 3z = 24

D. 4x + 2y - 3z = 24

Answer: B

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

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

B. $\dfrac{2}{k+1}$

C. $\dfrac{1}{k+1}$

D. $\dfrac{2}{k}$

Answer: C

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14. The coefficient of x^5 in the expansion of $(1+x)^{21}+(1+x)^{22}+\ldots+(1+x)^{30}$ is

A. $.^{31C_6 -^{21} C_6}$

B. $.^{51} C_5$

C. $.^{9} C_5$

D. $.^{30} C_5 +^{20} C_5$

Answer: A

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15. Let A = { - 4, - 2, -1, 0, 3, 5} and $f: A \rightarrow IR$ be defined by

$$f(x) = \begin{cases} 3x - 1 & \text{for} \quad x > 3 \\ x^2 + 1 & \text{for} \quad -3 \leq x \leq 3 \\ 2x - 3 & \text{for} \quad x < \ -3 \end{cases}$$

Then the range of f is

A. { - 11, 5, 2, 1, 10, 14}

B. {- 11, -7, 2, 1, 8, 14}

C. {- 11, 5, 2, 1, 8, 14}

D. {-11, -7, -5, 1, 10, 14}

Answer: A

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16. Find the incenter of the triangle formed by the straight lines $y = \sqrt{3}x$, $y = \ -\sqrt{3}x$ and $y = 3$

A. (0,2)

B. (1,2)

C. (2,0)

D. (2,1)

Answer: A

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17. The solution of the equation

$\left(x - 4y^3\right)\dfrac{dy}{dx} - y = 0, (y > 0)$ is

A. $x = y^3 + cy$

B. $x + 2y^3 = cy$

C. $y = x^3 + cx$

D. $y = 2x^3 = cx$

Answer: B

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18. If a circle with radius 2.5 units passes through the point (2,3) and (5,7) , then its centre is

A. (1,5,2)

B. (7,10)

C. (3,4)

D. (3.5,5)

Answer: D

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19. The circumcenter of the triangle formed by the point (1,2,3) (3,-1,5), (4,0,-3) is

A. (1,1,1)

B. (2,2,2)

C. (3,3,3)

D. $\left(\frac{7}{2}, \frac{-1}{2}, 1\right)$

Answer: D

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20. A bag P contains 5 white marbles and 3 black marbles. Four marbles are drawn at random form P and are put in an empty bag Q . If a marble drawn at rnadom from Q is found to be black then the probabiity that all the three black marbles in P are transfered to the bag Q is

A. $\frac{1}{7}$

B. $\frac{6}{7}$

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

D. $\frac{7}{8}$

Answer: A

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21. $\operatorname{sech}^{-1}\left(\frac{1}{\sqrt{2}}\right) + \cos ech^{-1}(-1) =$

A. 0

B. $\sqrt{2}+1$

C. $\sqrt{2}$

D. $\sqrt{2}-1$

Answer: A

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22. If the points whose position vectors are $3\bar{i}-2\bar{j}-\bar{k}, 2\bar{i}+3\bar{j}-4\bar{k}, -\bar{i}+\bar{j}+2\bar{k}, 4\bar{i}+5\bar{j}+\lambda\bar{k}$ are coplanar, then show that $\lambda = -\frac{146}{17}$.

A. $-\frac{146}{17}$

B. 8

C. -8

D. $\frac{146}{17}$

Answer: A

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23. The lines $y=2x+\sqrt{76}$ and $2y+x=8$ touch the ellips $\frac{x^2}{16}+\frac{y^2}{12}=1$. If the point of intersection of these two lines lie on a circle. Whose centre coincides with the centre of that ellipse, then the equation of that circle is

A. $x^2+y^2=28$

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

C. $x^2+y^2=12$

D. $x^2+y^2=\left(4+\sqrt{8}\right)^2$

Answer: A

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24. The equation of the pair of lines through the point (2,1) and perpendicular to the pair of lines $4xy + 2x + 6y + 3 = 0$ is

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

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

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

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

Answer: A

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25. The harmonic mean of two numbers is $-\frac{8}{5}$ and their geometric mean is 2 . The quadratic equation whose roots are twice those numbers is

A. $x^2 + 5x + 4 = 0$

B. $x^2 + 10x + 16 = 0$

C. $x^2 - 10x + 16 = 0$

D. $x^2 - 5x + 4 = 0$

Answer: B

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26. If z is a complex number with $|z| \geq 5$. Then the least value of $\left|z + \frac{2}{z}\right|$ is

A. $\frac{24}{5}$

B. $\frac{26}{5}$

C. $\frac{23}{5}$

D. $\frac{29}{5}$

Answer: C

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27. ΔABC is formed by a (1,8,4), B (0, -11,4) and C(2,-3,1) . If D is the foot of the perpendicular from A to BC . Then the coordinates of D are

A. (-4,5,2)

B. (4,5,-2)

C. (4,-5,2)

D. (4,-5,-2)

Answer: B

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28. For the function f(x) = (x-1) (x-2) difined on $\left[0, \frac{1}{2}\right]$, the value of c satisfying Lagrange's mean value theorem is

A. $\frac{1}{5}$

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

C. $\frac{1}{7}$

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

Answer: D

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29. A container is the shape of an inverted cone. Its height is 6m and radius is 4 m at the top. If it is filled with water at the rate $3m^3 / \min$ then the rate of change of height of water (in mt//min) when the water level is 3 m is

A. $\frac{3}{4\pi}$

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

C. 16π

D. 2π

Answer: A

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30. If the roots of the equation $x^3 - 7x^2 + 14x - 8 = 0$ are in geometric progression, then the difference between the largest and the smallest roots is

A. 4

B. 2

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

D. 3

Answer: D

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31. If the mean and variance of a binomial variate X are $\frac{4}{3}, \frac{8}{9}$ respectively, then P(X = 2) =

A. $\frac{4}{27}$

B. $\frac{16}{81}$

C. $\frac{8}{27}$

D. $\frac{8}{81}$

Answer: C

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32. If α is a non-real root of $x^7 = 1$ then $\alpha(1+\alpha)\left(1+\alpha^2+\alpha^4\right) =$

A. 1

B. 2

C. -1

D. -2

Answer: C

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33. If cot $\left(\cos^{-1} x\right) = \sec\left\{\tan^{-1}\left(\frac{a}{\sqrt{b^2 - a^2}}\right)\right\} : b > a,$

then x =

A. $\frac{b}{\sqrt{2b^2 - a^2}}$

B. $\frac{\sqrt{a^2 - a^2}}{ab}$

C. $\frac{a}{\sqrt{2b^2 - a^2}}$

D. $\frac{\sqrt{b^2 - a^2}}{a}$

Answer: A

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34. In $\Delta ABC, L, M, N$ are points on BC, CA, AB respectively , dividing them in the ration 1 : 2 , 2 : 3, 3 : 5 . If the point K divides AB in the ratio 5 :

3 , then $\frac{|\overline{AL}+\overline{BM}+\overline{CN}|}{|\overline{CH}|}=$

A. $\frac{5}{8}$

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

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

D. $\frac{1}{15}$

Answer: D

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35. The point to which the orgine is to be shifted to remove the first degree terms from the equation $2x^2+4xy-6y^2+2x+8y+1=0$ is

A. $\left(\frac{7}{8},\frac{3}{8}\right)$

B. $\left(\frac{-7}{8},\frac{-3}{8}\right)$

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

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

Answer: C

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36. If α, β, γ are the lengths of the tangents from the vertices of a triangle to its incircle. Then

A. $\alpha+\beta+\gamma=\frac{1}{r^2}(\alpha\beta\gamma)$

B. $\frac{1}{\alpha}+\frac{1}{\beta}+\frac{1}{\gamma}=r(\alpha\beta\gamma)$

C. $\alpha+\beta+\gamma=\frac{1}{r}(\alpha\beta\gamma)$

D. $\alpha^2+\beta^2+\gamma^2=\frac{2}{r}(\alpha\beta\gamma)$

Answer: A

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37. If $\int_0^{10} f(x)dx=5\text{then}\sum_{k=1}^{10}\int_0^1 f(k-1+x)dx=$

A. 50

B. 10

C. 5

D. 20

Answer: C

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38. The angle between the tangents drawn from the point (1,2) to the ellipse $3x^2 + 2y^2 - 5$ is

A. $\tan^{-1}\left(\frac{12\sqrt{5}}{5}\right)$

B. $\tan^{-1}\left(\frac{12\sqrt{5}}{13}\right)$

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

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

Answer: A

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39. If lx+ my = 1 is a normal to the hyperbola $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1, \text{then} a^2m^2 - b^2l^2 =$

A. $\frac{m^2}{l^2}(a^2 + b^2)^2$

B. $(l^2 + m^2)(a^2 + b^2)^2$

C. $\frac{l^2}{m^2}(a^2 + b^2)^2$

D. $l^2m^2(a^2 + b^2)^2$

Answer: D

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

A. $\frac{-1}{e} \log|x^e + e^x| + C$

B. $-e \log|x^e + e^x| + C$

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

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

Answer: C

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41. $If\Delta=\begin{vmatrix}1 & \cos\theta & 1\\ -\cos\theta & 1 & \cos\theta\\ -1 & -\cos\theta & 1\end{vmatrix}, then\Delta \text{lies in}$ the intervail

A. [2,4]

B. (2,4)

C. [1,4]

D. [-1,1]

Answer: A

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42. The equation of the circle whose diameter is the common chord of the circles

$x^2 + y^2 + 2x + 2y + 1 = 0$ and

$x^2 + y^2 + 4x + 6y + 6 = 0$ is

A. $10x^2 + 10y^2 + 18x + 16y + 5 = 0$

B. $3x^2 + 3y^2 - 3x + 6y - 8 = 0$

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

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

Answer: A

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43. $\frac{x-1}{3x+4} < \frac{x-3}{3x-2}$ holds. for all x in the interval

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

B. $\left(-\infty, \frac{-5}{4}\right)$

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

D. $\left(-\infty, \frac{-5}{4}\right) \cup \left(\frac{3}{4}, -\infty\right)$

Answer: A

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44. There are 10 intermediate stations on a railway line between two particular stations. The number of ways that a train can be made to stop at 3 of these intermediate stations so that no two of these halting stations are consecutive is

A. 56

B. 20

C. 126

D. 120

Answer: A

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45. The figure formed by the pairs of lines $6x^2 + 13xy + 6y^2 = 0$ and $6x^2 + 13xy + 6y^2 + 10x + 10y + 4 = 0$ is a

A. Square

B. Parallelogram

C. Rhombus

D. Rectangle

Answer: C

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46. If the point of intersection of the tangents drawn at the points where the line 5x + y + 1= 0 cuts the circle $x^2 + y^2 - 2x - 6y - 8 = 0$ is (a,b) , then 5a + b =

A. 3

B. -44

C. -1

D. 4

Answer: B

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47. If a, b and c are non-zero vectors such that a and b not perpendicular to each other, then the vector r which is perpendicular to a and satisfying $r \times b = c \times b$ is

A. $\dfrac{(a \times b) \times c}{c.\, a}$

B. $\dfrac{b \times (a \times c)}{b.\, c}$

C. $\dfrac{(b \times c) \times a}{a.\, b}$

D. $\dfrac{(c \times b) \times a}{a.\, c}$

Answer: C

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48. The tangents ot the parabola $y^2 = 4ax$ from an external point P make angles $\theta_1 \theta_2$ with the axis of the parabola . Such that tan $\theta_1 + \tan \theta_2$ = b where b is constant . Then P lies on

A. y = x +b

B. y + x = b

C. $y = \frac{x}{b}$

D. y = bx

Answer: D

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49. Find the points on the line $3x - 4y - 1 = 0$ which are at a distance of 5 units from the point (3,2).

A. $\left(-2, -\frac{7}{4}\right), \left(-3, \frac{-5}{2}\right)$

B. $\left(4, \frac{11}{4}\right). (-1, -1)$

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

D. $(7, 5), (-1, -1)$

Answer: D

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50. $\underset{x \to 0}{\text{Lt}} \frac{(1 - \cos 2x)(3 + \cos x)}{x \tan 4x}\bigg)$ is equal to

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

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

C. 1

D. 2

Answer: D

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51. The angle between the curves $x^2 + y^2 = 4$ and $x^2 = 3y$ is

A. $\tan^{-1}\frac{5}{\sqrt{3}}$

B. $\tan^{-1}\sqrt{\frac{5}{3}}$

C. $\tan^{-1}\frac{2}{\sqrt{3}}$

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

Answer: A

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52. If a, b, c are non-zero real numbers and if the equations (a-1) x = y +z, (b-1) y = z + x , (c - 1) z = x + y have a non-trival solution, then ab+bc+ca=

A. $a^2b^2c^2$

B. 0

C. abc

D. a + b+ c

Answer: C

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53. The number of different of preparing a garland using 6 distiuct white roses and 5 distinct red roses such that no two red roses come together is

A. 21600

B. 43200

C. 86400

D. 151200

Answer: B

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54. If a cylindrical vessel of given volume V with non lid on the top is to be made from a sheet of metal, then the radius (r) and height (h) of the vessel so that the metal sheet used is minimum is

A. $r = 3\sqrt{\frac{\pi}{V}}, h = 3\sqrt{\frac{\pi}{V}}$

B. $r = \sqrt{\pi V}, h = \sqrt{\pi V}$

C. $r = 3\sqrt{\frac{V}{\pi}}, h = 3\sqrt{\frac{V}{\pi}}$

D. $r = \sqrt{\frac{V}{\pi}}, h = \sqrt{\frac{V}{\pi}}$

Answer: C

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55. $\int \frac{x + \sin x}{1 + \cos x} dx =$

A. $x\tan\frac{x}{2} + C$

B. $x\text{sion}\frac{x}{2} + \cos\frac{x}{2} + C$

C. $x\tan\frac{x}{2} + \sec\frac{x}{2} + C$

D. $x\sec\frac{x}{2}+\tan\frac{x}{2}+C$

Answer: A

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56. If $I_n=\int\frac{\sin nx}{\cos x}dx$, then $I_n=$

A. $\frac{-2}{n-1}\cos(n-1)x-l_{n-2}$

B. $\frac{2}{n-1}\cos(n-1)x+l_{n-2}$

C. $\frac{-2}{n+1}\sin(n+1)x-l_{n-2}$

D. $\frac{-2}{n+1}\cos(n-1)x-l_{n-2}$

Answer: A

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57. If tan α and $\tan\beta$ are the roots of the equation $x^2 + px + q = 0$, then the value of $\sin^2(\alpha+\beta) + p\cos(\alpha+\beta)\sin(\alpha+\beta) + q\cos^2(\alpha+\beta)$ is

A. p + q

B. p

C. q

D. $\frac{p}{p+q}$

Answer: C

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58. If ω is a complex cube root of unity, then for any $n > 1\sum_{r=1}^{n-1} r(r+1-\omega)\left(r+1-\omega^2\right] =$

A. $\frac{n^2(n+1)^2}{4}$

B. $\frac{n(n+1)(2n+1)}{6}$

C. $\frac{n(n-1)}{4}(n^2+3n+4)$

D. $\frac{n(n+1)(2n+1)}{4}$

Answer: C

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59. Let N be the set of all natural number , Z be the set of all integers and $\sigma : N \to Z$ be difined by

$$\sigma(n) = \begin{cases} \frac{n}{2}, & \text{if} \quad n \text{ is even} \\ & \qquad \text{then} \\ -\frac{n-1}{2}, & \text{if} \quad n \text{ is odd} \end{cases}$$

A. σ is onto not one-one

B. σ is one -one but not one

C. $signa$ is neither one-one nor onto

D. σ is one -one and onto

Answer: D

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60. $.^{37}C_4 + \sum_{r=1}^{5} (42-r)_{C_3} =$

A. $.^{41}C_4$

B. $.^{39}C_4$

C. $.^{36}C_4$

D. $.^{42}C_4$

Answer: D

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61. The variance of the following date is

x_1	6	10	14	18	24	28	30
f_1	2	4	7	12	8	4	3

A. 33.4

B. 34.3

C. 43.4

D. 44.3

Answer: C

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62. The differential equation corresponding to the family of circles in the plane touching the Y-axis at the origin is

A. $\frac{dy}{dx} = \frac{y^2 - x^2}{2xy}$

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

C. $\frac{dy}{dx} = \frac{x^2 - y^2}{2xy}$

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

Answer: A

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63. $p, x_1, x_2, \ldots x_n$ and $q, y_1, y_2, \ldots, y_n$ are two arithmetic progressions with common differences a and b respectively. If α and β are the arithmetic means of $x_1, x_2, \ldots . X_n,$ and $y_1, y_2, \ldots . Y_n$ respectivley . then the locus of $p(\alpha, \beta)$ is

A. a(x - p) = b (y - q)

B. b(x - p) = a (y - q)

C. $\alpha(x - p) = \beta(y - q)$

D. $p(x - \alpha) = q(y - \beta)$

Answer: B

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64. If $\alpha \neq 0$ and mean deviation of the observations {kα}, for k = 1,2, ... 50 about its median is 50 , then $|\alpha|$ =

A. 4

B. 3

C. 2

D. 5

Answer: A

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65. If 2kx + 3y - 1 = 0 , 2x + y + 5 = 0 are conjugate lines with respect to the circle $x^2 + y^2 - 2x - 4y - 4 = 0$, t hen k =

A. 3

B. 4

C. 1

D. 2

Answer: C

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66. if $\frac{5x^2+2}{x^3+x}=\frac{A_1}{x}+\frac{A_2x+A_3}{x^2+1}, then(A_1, A_2, A_3)=$

A. (0,2,3)

B. (3,0,2)

C. (2,3,0)

D. (2,0,3)

Answer: C

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67. The sum of first n terms of $\frac{1}{2\cdot5}+\frac{1}{5\cdot8}+\frac{1}{8\cdot11}+\ldots$ is

A. $\frac{3n}{2(3n+2)}$

B. $\frac{3n}{3n+2}$

C. $\frac{n}{2(3n+2)}$

D. $\frac{n}{3n+2}$

Answer: C

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68. Find the equation of the parabola whose axis is parallel to X-axis and which passes through these points.

(-2,1),(1,2), and (-1,3)

A. $18y^2 - 12x - 21y - 21 = 0$

B. $5y^2 + 2x - 21y + 20 = 0$

C. $15y^2 + 12x - 11y + 20 = 0$

D. $25y^2 - 2x - 65y + 36 = 0$

Answer: B

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69. In $\Delta ABC, b\cos(C+\theta) + c\cos(B-\theta) =$

A. $a \cot \theta$

B. $a \cos \theta$

C. $a \tan \theta$

D. $a \sin \theta$

Answer: B

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70. The number of solution of the trigonometric equation $1 + \cos x . \cos 5x = \sin^2 x$ in $[0, 2\pi]$ is

A. 8

B. 12

C. 10

D. 6

Answer: C

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71. If α, β, γ are the roots of $x^3 + px^2 + qx + r = 0$, then the value of $(1 + \alpha^2)(1 + \beta^2)(1 + \gamma^2)$ is

A. $(r - p)^2 = (r - q)^2$

B. $(1 + p)^2 + (1 + q)^2$

C. $(r + p)^2 + (q + 1)^2$

D. $(r - p)^2 + (q - 1)^2$

Answer: D

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72. If a system of three linear equations is three unknowns, which is in the matrix equations from of AX = D is inconsistent then

$\frac{\text{rank of A}}{\text{rank of} AD}$ is

A. Less then one

B. greater than or equal to one

C. One

D. greater than one

Answer: A

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73. The angle between the two circles , each passing through the centre of the other is

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

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

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

D. π

Answer: A

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74. If $\log_{\frac{1}{\sqrt{3}}}\left\{\frac{|z|^2-|z|+1}{2+|z|}\right\} > -2$, then z lies inside

A. a triangle

B. an ellipse

C. a circle

D. a square

Answer: C

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75. A circle having centre at the origin passes through the three vertices of a n equilateral triangle the length of its median being 9 units. Then the equation of that circle is

A. $x^2+y^2=9$

B. $x^2 + y^2 = 18$

C. $x^2 + y^2 = 36$

D. $x^2 + y^2 = 81$

Answer: C

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76. $1 + \cos 10^\circ + \cos 20^\circ + \cos 30^\circ$ =

A. $4\sin 10^\circ \sin 20^\circ \sin 30^\circ$

B. $4\cos 5^\circ \cos 10^\circ \cos 15^\circ$

C. $4\cos 10^\circ \cos 20^\circ \cos 30^\circ$

D. $4\sin 5^\circ \sin 10^\circ \sin 15^\circ$

Answer: B

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77. If the points (1, 2) and (3, 4) were to be on the same side of the line $3x - 5y + a = 0$ then

A. $\{x \in IR : x > 11\}$

B. $\{x \in IR : x > 11\} \cup \{x \in IR : x < 7\}$

C. $\{x \in IR : x < 7\}$

D. ϕ

Answer: B

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78. If $x = \frac{1 \cdot 3}{3 \cdot 6} + \frac{1 \cdot 3 \cdot 5}{3 \cdot 6 \cdot 9} + \frac{1 \cdot 3 \cdot 5 \cdot 7}{3 \cdot 6 \cdot 9 \cdot 12} + \ldots$ to infinite terms, then $9x^2 + 24x =$

A. 31

B. 11

C. 41

D. 21

Answer: B

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79. The triad (x,y,z) of real number such that $\left(\hat{i}-\hat{j}+2\hat{k}\right)=\left(2\hat{i}+3\hat{j}-\hat{k}\right)x+\left(\hat{i}-2\hat{j}+2\hat{k}\right)y+\left(-2\hat{i}+\hat{j}-2\hat{k}\right)$ z is

A. (-,2,5,3)

B. (2,-5,3)

C. (2,5,3)

D. (2,5,-3)

Answer: C

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80. If the volume of the tetrahedron formed by the cotermionus edges a, b and c is 4, then the volume of the parallelopiped formed by the coterminous edges $a \times b, b \times c$ and $c \times a$ is

A. 576

B. 48

C. 16

D. 144

Answer: A

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81. $f(x) = \frac{x}{e^x - 1} + \frac{x}{2} + 2\frac{\cos^3 x}{2}$ on R-{0} is

A. one one function

B. bijection

C. algebraic function

D. even function

Answer: D

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82. Consider the following units

List I	List II
(A) $f(x) = \frac{\lvert x+2 \rvert}{x+2}, x \neq -2$	1. $\left[\frac{1}{3}, 1\right]$
(B) $g(x) = \lvert [x] \rvert, x \in R$	2. Z
(C) $h(x) = \lvert x - [x] \rvert, x \in R$	3. W
(D) $f(x) = \frac{1}{2 - \sin 3x}, x \in R$	4. $[0, 1)$
	5. $\{-1, 1\}$

A. 5 3 2 1

B. 3 2 4 1

C. 5 3 4 1

D. 1 2 3 4

Answer: C

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83. Assertion (A)

$(1) + (1 + 2 + 4) + (4 + 6 + 9) + (9 + 12 + 16) + \ldots\ldots + (81 + 90 + 10$

Reason (R) $\sum_{r=1}^{11} \left(r^3 - [r-1]^3\right) = n^3$ for any natural number n

A. Both (A) and (R) are true and (R) is the correct explanationn 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: A

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84. IF $\begin{bmatrix}1 & 0\\ 0 & -1\end{bmatrix}$, $P=\begin{bmatrix}1 & 1\\ 0 & 1\end{bmatrix}$ and $X=APA^T$ then $A^TX^{50}A=$

A. $\begin{bmatrix}0 & 1\\ 1 & 0\end{bmatrix}$

B. $\begin{bmatrix}2 & 1\\ 0 & -1\end{bmatrix}$

C. $\begin{bmatrix}25 & 1\\ 1 & -25\end{bmatrix}$

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

Answer: D

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85. IF [x] is the greatest integer less than or equal to x and IxI is the modulus of x, then the system of three equations

2x+3|y|+5[z]=0,x+|y|-2 [z]=4, z+|y|+[z]=1` has

A. a unique solution

B. finitely many solutions

C. infinitely many solutions

D. no solution

Answer: C

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86. Investigate the values of λ and μ for the system $x+2y+3z=6,\ x+3y+5z=9,\ 2x+5y+\lambda z=\mu$ and match the values in List-I with the terms in List -II

	List I	List II
(A)	$\lambda = 8, \mu \neq 15$	1. Infinitely many solutions
(B)	$\lambda \neq 8, \mu \in R$	2. No solution
(C)	$\lambda = 8, \mu = 15$	3. Unique solution

A. 1 2 3

B. 2 3 1

C. 3 1 2

D. 3 2 1

Answer: B

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87. IF $z = x + iy, x, y, \in R, (x, y) \neq (0, -4)$ and Arg $\left(\frac{2z-3}{z+4i}\right) = \frac{\pi}{4}$, then the locus of z is

A. $2x^2 + 2y^2 + 5x + 5y - 12 = 0$

B. $2x^2 - 3xy + y^2 + 5x + y - 12 = 0$

C. $2x^2 + 3xy + y^2 + 5x + y + 12 = 0$

D. $2x^2 + 2y^2 - 11x + 7y - 12 = 0$

Answer: A

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88. IF $z = x + iy, x, y \in R$ and the imaginary part of $\left(\frac{\bar{z}-1}{\bar{z}-i}\right)$ is 1,then the locus of z is

A. $x + y + 1 = 0$

B. $x + y + 1 = 0, (x, y) \neq (0, -1)$

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

D. $x^2 + y^2 - x + 3y + 2 = 0, (x, y) \neq (0, -1)$

Answer: D

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89. IF ω represents a complex cube root of unity, then $\left(1+\frac{1}{\omega}\right)\left(1+\frac{1}{\omega^2}\right)+\left(2+\frac{1}{\omega}\right)\left(2+\frac{1}{\omega^2}\right)+\ldots+\left(n+\frac{1}{\omega}\right)\left(n+\frac{1}{\omega^2}\right)$

A. $\frac{n(n^2+1)}{3}$

B. $\frac{n(n^2+2)}{3}$

C. $\frac{n(n^2-2)}{3}$

D. $\frac{n^2(n-1)}{6}$

Answer: B

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90. IF ω is a complex cube root of unity

$$\sum_{r=1}^{9} r(r+1-\omega)\left(r+1-\omega^2\right) =$$

A. 5025

B. 4020

C. 2016

D. 3015

Answer: D

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91. IF α and β are the roots of $x^2+7x+3=0$ and $\dfrac{2\alpha}{3-4\alpha}, \dfrac{2\beta}{3-4\beta}$ are the roots of $ax^2+bx+c=0$ and GCD of a,b,c is 1, then a+b+c=

A. 11

B. 0

C. 243

D. 81

Answer: D

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92. IF α, β are the roots of $x^2 + bx + c = 0, \gamma, \delta$ are the roots of $x^2 + b_1x + c_1 = 0$ and $\gamma < \alpha < \delta < \beta$, then $(c - c_1)^2 <$

A. $(b_1 - b)(bc_1 - b_1c)$

B. 1

C. $(b - b_1)^2$

D. $(c - c_1)(b_1c - b_1c_1)$

Answer: A

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93. Let a,b and s be the sides of a scalane triangle. IF λ is a real number such that the roots of the equation $x^2 + 2(a+b+c)x + 3\lambda(ab+bc+ca) = 0$ are real, then the interval in which λ lies is

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

B. $\left(\frac{5}{3}, \infty\right)$

C. $\left(\frac{1}{3}, \frac{5}{3}\right)$

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

Answer: A

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94. The polynomial equation of degree 4 having real coefficients with three of its roots as $2 \pm \sqrt{3}$ and $1 + 2i$ is

A. $x^4 - 6x^3 - 14x^2 + 22x + 5 = 0$

B. $x^4 - 6x^3 - 19x + 22x - 5 = 0$

C. $x^4 - 6x^3 + 19x - 22x + 5 = 0$

D. $x^4 - 6x^3 + 14x^2 - 22x + 5 = 0$

Answer: D

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95. All the letters of the work ANIMAL are permuted in all possible ways and the permutations thus formed are arranged in dictionary order. IF the rank of the work ANIMAL is x, then the permutation with rank x, among the permutations obtained by permuting the letters of the word PERSON and arranging the permutations thus formed in dictionary order is

A. ENOPRS

B. NOSPRE

C. NOEPRS

D. ESORNP

Answer: D

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96. A student is allowed to choose atmost n books from a collection of 2n+1 books. IF the total number of ways in which he can select atleast one book is 255, then the value of n is

A. 4

B. 5

C. 6

D. 7

Answer: A

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97. The sum of all the coefficients in the binomial expansion of $(1+2x)^n$ is 6561. Let $R=(1+2x)^n=1+F$, where $1 \in N$ and $0<F<1$. IF $x=\frac{1}{\sqrt{2}}$ then $1-\frac{F}{1+\left(\sqrt{2}-1\right)^4}$ =

A. $(3\sqrt{2}-4)$

B. $4(3\sqrt{2}+4)$

C. $(\sqrt{2}-1)^4$

D. 1

Answer: C

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98. If $\frac{(1-px)^{-1}}{(1-qx)}=a_0+a_1x+a_2x^2+a_3x^3+\ldots\ldots$ then $a_n=$

A. $\frac{p^{n+1}-q^{n+1}}{q-p}$

B. $\frac{p^{n+1}-q^{n+1}}{p-q}$

C. $\frac{p^n - q^n}{q - p}$

D. $\frac{p^n - q^n}{p - q}$

Answer: B

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99. IF

$$\frac{3}{(x-1)(x^2+x+1)} = \frac{1}{x-1} - \frac{x+2}{x^2+x+1} = f_1(x) - f_2(x) \text{ and } - \frac{}{(x}$$

A. 1

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

C. 0

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

Answer: C

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100. Let M and m respectively denote the maximum and the minimum values of $\left[f(\theta)^2\right], where f(\theta) = \sqrt{a^2 + \cos^2\theta + b^2\sin^2\theta} + \sqrt{a^2\sin^2\theta + b^2\cos^2\theta}.$

Then M-m=

A. $a^2 + b^2$

B. $(a - b)^2$

C. a^2b^2

D. $(a + b)^2$

Answer: B

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101. IF$\cos A = \dfrac{-60}{61}$ and $\tan B = -\dfrac{7}{24}$ and neither A nor B in the second quadrant, then the angle $A + \dfrac{B}{2}$ lies in the quadrant

A. 1

B. 2

C. 3

D. 4

Answer: A

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102.

$\cos^2 5^\circ - \cos^2 15^\circ - \sin^2 15^\circ + \sin^2 35^\circ + \cos 15^\circ \sin 15^\circ - \cos 5^\circ \sin 35^\circ$

A. 0

B. 1

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

D. 2

Answer: A

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103. IF $\cos\theta \neq 0$, and $\sec\theta - 1 = (\sqrt{2}-1)\tan\theta$ then $\theta =$

A. $n\pi + \frac{\pi}{8}, n \in Z$

B. $2n\pi + \frac{\pi}{4}$ or $2n\pi, n \in Z$

C. $2n\pi + \frac{\pi}{8}, n \in Z$

D. $2n\pi - \frac{\pi}{4}$ or $2n\pi, n \in Z$

Answer: B

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104. $\cot\left[\sum_{n=3}^{32} \cot^{-1}\left(1 + \sum_{k=1}^{n} 2K\right)\right]$ =

A. $\frac{10}{3}$

B. $\frac{8}{3}$

C. $\frac{14}{3}$

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

Answer: A

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105. IF $\sin x \cos hy = \cos\theta, \cos x \sin hy = \sin\theta$ and $4\tan x = 3$.Then,

$\sinh^2 y =$

A. $\frac{4}{5}$

B. $\frac{9}{16}$

C. $\frac{9}{25}$

D. $\frac{16}{25}$

Answer: D

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106. In triangle ABC, if

$$\frac{b+c}{9}=\frac{c+a}{10}=\frac{a+b}{11}, then \frac{\cos A+\cos B}{\cos C}=$$

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

B. $\frac{10}{11}$

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

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

Answer: C

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107. In a ΔABC, with usual notation, match the items in List-I with the terms in List-II and choose the correct option.

	List I	List II
(A)	$r_1 r_2 \sqrt{\left(\frac{4R - r_1 - r_2}{r_1 + r_2}\right)}$	1. b
(B)	$\frac{r_2(r_3 + r_1)}{\sqrt{r_1 r_2 + r_2 r_3 + r_3 r_1}}$	2. a^2, b^2, c^2 are in AP
(C)	$\frac{a}{c} = \frac{\sin(A - B)}{\sin(B - C)}$	3. Δ
(D)	$bc \cos^2 \frac{A}{2}$	4. $R r_1 r_2 r_3$
		5. $s(s - a)$

A. 4 3 1 5

B. 5 4 3 2

C. 3 1 2 5

D. 4 5 2 1

Answer: C

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108. If a,b and c are the sides of ΔABC for which $r_1 = 8, r_2 = 12$ and $r_3 = 24$ then the ordered triad (a,b,c)=

A. (12,20,16)

B. (12,16,20)

C. (16,12,20)

D. (20,16,12)

Answer: B

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109. If 4i + 7j + 8k, 2i + 3j + 4k, 2i + 5j + 7k are position vectors of A, B, C of Δ ABC then position vector of the point where the bisector of angle A meets BC is

A. $2\hat{i} + \frac{13}{3}\hat{j} + 2\hat{k}$

B. $2\hat{i} - \frac{13}{3}\hat{j} + 6\hat{k}$

C. $2\hat{i} + 13\hat{j} + 6\hat{k}$

D. $2\hat{i} + \frac{13}{3}\hat{j} + 6\hat{k}$

Answer: D

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110. The equation of the plane passing through the point $\hat{i} + 2\hat{j} - \hat{k}$ are perpendicular to the line of intersection of the planes $r.\left(3\hat{i} - \hat{j} + \hat{k}\right) = 1$ and $r.\left(\hat{i} + 4\hat{j} - 2\hat{k}\right) = 2$, is

A. $r.\left(-2\hat{i} - 5\hat{j} + \hat{k}\right) = 0$

B. $r.\left(\hat{i} + 7\hat{j} + 4\hat{k}\right) = 0$

C. $r.\left(2\hat{i} - 7\hat{j} - 13\hat{k}\right) = 1$

D. $r.\left(-2\hat{i} + 7\hat{j} + 13\hat{k}\right) = 0$

Answer: C

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111. If the position vectors of the vertices A,B and C of ΔABC are $\hat{i}+2\hat{j}-5\hat{k}, \ -2\hat{i}+2\hat{j}+\hat{k}$ and $2\hat{i}+\hat{j}-\hat{k}$ respectively, then $\angle B =$

A. $\cos^{-1}\left(\frac{7}{3\sqrt{10}}\right)$

B. $\cos^{-1}\left(\frac{8}{105}\right)$

C. $\cos^{-1}\left(\frac{1}{\sqrt{42}}\right)$

D. $\cos^{-1}\left(-\frac{7}{3\sqrt{10}}\right)$

Answer: B

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112. IF the position vectors of the vertices of a ΔABC are $OA = 3\hat{i}+\hat{j}+2\hat{k}, OB = \hat{i}+2\hat{j}+3\hat{k}$ and $OC = 2\hat{i}+3\hat{j}+\hat{k}$, then the length of the altitude of ΔABC drawn from A is

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

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

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

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

Answer: B

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113. A new tetrahedron is formed by joining the centroids of the faces of a given tetrahedron OABC. Then the ratio of the volume of the new tetrahedron to that of the given tetrahedron is

A. $\frac{3}{25}$

B. $\frac{1}{27}$

C. $\frac{5}{62}$

D. $\frac{1}{162}$

Answer: B

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114. Let $A = 2\hat{i} + \hat{j} - 2\hat{k}$ and $B = \hat{i} + \hat{j}$. If C is a vector such that $A.\,C = |C|, |C - A| = 2\sqrt{2}$ and the angle between $A \times B$ and C is 30°, then the value of $|(A \times B) \times C|$ is

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

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

C. 3

D. 2

Answer: B

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115. IF $a_0, a_1 \dots, a_{11}$ are the arithmetic progression with common difference d, then their mean deviation from their arithmetic mean is

A. $\frac{30}{11}|d|$

B. $2|d|$

C. $3|d|$

D. $12|d|$

Answer: C

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116. The variance of the following continuous frequency distribution is

Class Interval	0-10	10-20	20-30	30-40
Frequency	2	3	4	1

A. 201

B. 62

C. 19

D. 84

Answer: D

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117. IF two sections of strengths 30 and 45 are formed from 75 students who are admitted in a school,then the probability that two particular students are always together in the same section is

A. $\frac{66}{185}$

B. $\frac{19}{37}$

C. $\frac{29}{185}$

D. $\frac{18}{37}$

Answer: B

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118. A bag contains 2n coins out of which n-1 are unfair with heads on both sides and the remaining are fair. One coin is picked from the bag at random and tossed. If the probability that head falls in the toss is $\frac{41}{56}$, then the number of unfair coins in the bag is

A. 18

B. 15

C. 13

D. 14

Answer: C

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119. Bag A contains 6 Green and 8 Red balls and bag B contain 9 Green and 5 Red balls . A card is drawn at random from a well shuffled pack of 52 playing cards. IF is a spade, two balls are drawn at random from bag A, otherwise two balls are drawn at random from bag B. IF the two balls are found to be of the same colour, then the probability that they are drawn from bag A is

A. $\frac{43}{181}$

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

C. $\frac{48}{131}$

D. $\frac{43}{138}$

Answer: A

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120. A random variable X has the probability distribution

$X = x_i$	1	2	3	4	5	6
$P(X = x_i)$	0.2	0.3	0.12	0.1	0.2	0.08

A. 0.31

B. 0.62

C. 0.82

D. 0.41

Answer: C

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121. In a poisson distribution with unit mean, $\sum_{x=0}^{\infty} |x - \bar{x}| P(X = x) =$ ($\bar{x}$ is the mean of the distribution).

A. e

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

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

D. $\frac{2}{3e}$

Answer: C

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122. Two straight rods of lengths 2a and 2b move along the coordinate axes in such a way that their extremities are always concyclic. Then the locus of the centres of such circles is

A. $2(x^2 + y^2) = a^2 + b^2$

B. $2(x^2 - y^2) = a^2 - b^2$

C. $x^2 + y^2 = a^2 + b^2$

D. $x^2 - y^2 = a^2 - b^2$

Answer: D

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123. When the coordinate axes ar rotated about the origin in the positive direction through an angle $\frac{\pi}{4}$, IF the equation $25x^2 + 9y^2 = 225$ is transformed to $\alpha x^2 + \beta xy + y\gamma^2 = \delta$, then $\left(\alpha + \beta + \gamma - \sqrt{\delta}\right)^2$=

A. 3

B. 9

C. 4

D. 16

Answer: B

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124. The equation of the line through the point of intersection of the lines 3x-4y+1=0 and 5x+y-1=0 and making equal non-zero intercepts on the coordinate axes is

A. $2x + 2y = 3$

B. $23x + 23y = 6$

C. $23x + 23y = 11$

D. $2x + 2y = 7$

Answer: C

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125. The line through P(a,2) where $a \neq 0$, making an angle 45° with the positive direction of the X-axis meet the curve $\frac{x^2}{9} + \frac{y^2}{4} = 1$ at A and D and the coordinate axes at B and C. IF PA, PB, PC and PD are in the geometric progression, then 2a=

A. 13

B. 7

C. 1

D. -13

Answer: A

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126. If the equations of the perpendicular bisectors of the sides AB and AC of a Δ ABC are x - y + 5 = 0 and x + 2y =0 respectively and if A is (1,-2), then the equation of the perpendicular bisector of the side BC is

A. $14x + 23y - 40 = 0$

B. $12x + 17y - 28 = 0$

C. $14x - 29y - 30 = 0$

D. $7x - 12y + 15 = 0$

Answer: A

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127. If each line of a pair of lines passing through origin is at a perpendicular distance of 4 units from the point (3,4) then the equation of the pair of lines is

A. $7x^2 + 24xy = 0$

B. $7y^2 + 24xy = 0$

C. $7y^2 - 24xy = 0$

D. $7x^2 - 24xy = 0$

Answer: B

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128. Variable straight lines y=mx+c make intercepts on the curve $y^2 - 4ax = 0$ which subtend a right angle at the origin. Then the point of concurrence of these lines y=mx+c is

A. $(4a, 0)$

B. $(2a, 0)$

C. $(-4a, 0)$

D. $(-2a, 0)$

Answer: A

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129. The abscissae of two points P,Q are the roots of the equation $2x^2 + 4x - 7 = 0$ and their ordinates are the roots of the equation $3x^2 - 12x - 1 = 0$. Then the centre of the circle with PQ as a diameter is

A. $(-1, 2)$

B. $(-2, 6)$

C. $(1, -2)$

D. $(2, -6)$

Answer: A

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130. The angle between a pair of tangents drawn from a point P to the circle $x^2 + y^2 + 4x - 6y + 9\sin^2\alpha + 13\cos^2\alpha = 0$ is 2α. The equation of the locus of the point P is

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

B. $x^2 + y^2 + 4x - 6y - 9 = 0$

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

D. $x^2 + y^2 + 4x - 6y + 9 = 0$

Answer: D

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131. The equation to the circle whose radius is 3 and which touches internally the circle $x^2 + y^2 - 4x + 6y - 12 = 0$ at this point (-1,1) is

A. $5x^2 + 5y^2 + 9x - 6y - 7 = 0$

B. $5x^2 + 5y^2 - 8x - 14y - 32 = 0$

C. $5x^2 + 5y^2 - 6x + 8y - 8 = 0$

D. $5x^2 + 5y^2 + 6x - 8y - 12 = 0$

Answer: B

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132. Suppose that the circle $x^2 + y^2 + 2gx + 2fy + c = 0$ has its centre on $2x + 3y - 7 = 0$ and cuts the circles $x^2 + y^2 - 4x - 6y + 11 = 0$ and $x^2 + y^2 - 10x - 4y + 21 = 0$ orthogonally. Then $5g - 10f + 3c =$

A. 0

B. 1

C. 3

D. 9

Answer: D

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133. If the radical axis of the circles $x^2 + y^2 + 2gx + 2fy + c = 0$ and $2x^2 + 2y^2 + 3x + 8y + 2c = 0$ touches the circle $x^2 + y^2 + 2x + 2y + 1 = 0$, then $(4g - 3)(f - 2) =$

A. 0

B. -1

C. 1

D. 2

Answer: A

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134. The parabola $x^2 = 4ay$ makes an intercept of length $\sqrt{40}$ units on the line $y = 1 + 2x$ then a values of 4a is

A. A 2

B. B -2

C. C -1

D. D 4

Answer: B

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135. The locus of the points of intersection of perpendicular normals of the parabola $y^2 = 4ax$ is

A. $y^2 - 2ax + a^2 = 0$

B. $y^2 - ax + 2a^2 = 0$

C. $y^2 - ax + 2a^2 = 0$

D. $y^2 - ax + 3a^2 = 0$

Answer: D

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136. P is a variable point on the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ with foci F_1 and F_2. IF A is the area of the triangle PF_1, F_2, then the maximum value of A is

A. $\frac{e}{ab}$

B. $\frac{ae}{b}$

C. $\frac{ae}{b}$

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

Answer: C

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137. If the line joining the point A (a) and $B(\beta)$ on the ellipse $\frac{x^2}{25}+\frac{y^2}{9}=1$ is a focal chord, then one possible value of $\cot\frac{\alpha}{2}.\cot\frac{\beta}{2}$ is

A. -3

B. 3

C. -9

D. 9

Answer: C

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138. The equation of a tangent to the hyperbola $16x^2 - 25y^2 - 96x + 100y - 356 = 0$ which makes an angle 45° with its transverse axis is

A. $x - y + 2 = 0$

B. $x - y + 4 = 0$

C. $x + y + 2 = 0$

D. $x + y + 4 = 0$

Answer: A

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139. If P(0,7,10), Q(-1,6,6) and R (-4,9,6) are three points in the space , then PQR is

A. right angled isosceles triangle

B. equilateral triangle

C. isosceles but not right angled triangle

D. scalene triangle

Answer: A

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140. A(2,3,5), B(a,3,3) and $C(7, 5, \beta)$ are the vertices of a triangle. If the median through A is equally inclined with the co-ordinate axes, then $\cos^{-1}\left(\frac{\alpha}{\beta}\right) =$

A. $\cos^{-1}\left(\frac{-1}{9}\right)$

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

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

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

Answer: A

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141. The plane $3x+4y+6z+7=0$ is rotated about the line $r=\left(\hat{i}+2\hat{j}-3\hat{k}\right)+t\left(2\hat{i}-3\hat{j}+\hat{k}\right)$ until the plane passes through origin. The equation of the plane is the new position is

A. $x+y+z=0$

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

C. $4x-5y-2z=0$

D. $x+2y+4z=0$

Answer: A

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142. IF $\lim_{x \to \infty} \left\{ \frac{x^3+1}{x^2+1} - (\alpha x + \beta) \right\}$ exist and equal to 2, then the ordered pair (α, β) of real numbers is

A. $(1, -1)$

B. (-2,1)

C. (-1,1)

D. (1,-2)

Answer: D

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143. For $k > 0$, $\sum_{x=0}^{\infty} \frac{k^x}{x!} \lim_{n \to \infty} \frac{n!}{(n-x)!} \left(1 - \frac{k}{n}\right)^{n-x} \left(\frac{1}{n}\right)^x =$

A. 0

B. k

C. x

D. 1

Answer: D

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144. Let $f: R \to R$ be the function defined by

$$f(x)=\begin{cases}5 & \text{if} \quad x<1 \\ a+bx & \text{if} \quad 1<x<3 \\ b+5x & \text{if} \quad 3 \le x<5 \\ 30 & \text{if} \quad x \ge 5\end{cases}$$ then f is

A. continuous if a=5 and b=5

B. continuous if a=0 and b=5

C. continuous if a=-5 and b=10

D. not continuous for any values of a and b

Answer: D

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145. Let [x] denote the greatest integer less than or equal to x, Then the number of points where the function $y=[x]+1|1-x|,\ -1\leq x\leq 3$ is not differentiable, is

A. 1

B. 2

C. 3

D. 4

Answer: D

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146. If $\sqrt{1-x^6}+\sqrt{1-y^6}=a\left(x^3-y^3\right), theny^2\frac{dy}{dx}=$

A. $\sqrt{\frac{1-y^6}{1-x^6}}$

B. $x\sqrt{\frac{1-y^6}{1-x^6}}$

C. $x^2\sqrt{\frac{1-y^6}{1-x^6}}$

D. $\frac{1}{x^2}\sqrt{\frac{1-y^6}{1-x^6}}$

Answer: C

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147. If y=f(x) is twice differentiable function such that at a point $P, \frac{dy}{dx}=4, \frac{d^2y}{dx^2}=-3, then\left(\frac{d^2x}{dy^2}\right)=$

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

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

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

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

Answer: D

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148. The time T of oscillation of a simple pendulum of length L is governed by $T = 2\pi\sqrt{\frac{L}{g}}$, where g is a constant. The percentage by which the length be changed in order to correct an error of loss equal to 2 minutes of time per day is

A. $-\frac{5}{18}$

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

C. $\frac{1}{6}$

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

Answer: A

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149. Let A,G,H and S respectively denote the arithmetic mean, geometric mean, harmonic mean and the sum of the numbers $a_1, a_2, a_3 \ldots\ldots\ldots a_n$.

Then the value of x at which the function $f(x) = \sum_{k=1}^{n}(x - a_k)^2$ has minimum is

A. S

B. H

C. G

D. A

Answer: D

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150. For $m > 1, n > 1$ the value of c for which the Rolle's theorem is applicable for the function $f(x) = x^{2m-1}(a - x)^{2n}$ in (0,a) is

A. $\dfrac{2am - 1}{m + 2n - 1}$

B. $\dfrac{a(m - n + 1)}{2m + 2n}$

C. $\dfrac{a(2m - 1)}{2m + 2n - 1}$

D. $\dfrac{a(2m+1)}{m+n-1}$

Answer: C

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151. If the function $f:[-1,1] \rightarrow R$ defined by

A. a maximum

B. a minimum

C. both maximum and minimum

D. neither maximum nor minimum

Answer: D

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152. $\displaystyle\int \frac{(x-1)dx}{(x+1)\sqrt{x^3+x^2+x}} =$

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

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

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

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

Answer: A

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153. If $I(x)=\int x^2(\log x)^2 dx$ and $I(I)=0$ then I(x)

A. $\frac{x^3}{18}\left[8(\log x)^2-3\log x\right]+\frac{7}{18}$

B. $\frac{x^3}{27}\left[9(\log x)^2+6\log x\right]-\frac{2}{27}$

C. $\frac{x^3}{27}\left[9(\log x)^2+6\log x+2\right]-\frac{2}{27}$

D. $\frac{x^3}{27}\left[9(\log x)^2+6\log x-2\right]+\frac{2}{27}$

Answer: C

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154. $\int \frac{x^5 dx}{(x^2+x+1)(x^6+1)(x^4-x^3+x-1)} =$

A. $\log_e\left|\frac{x^6-1}{x^6+1}\right| + c$

B. $\frac{1}{12}\log_e\left|\frac{x^6-1}{x^6+1}\right| + c$

C. $\frac{1}{12}\log_e\left|\frac{x^4+1}{x^4-1}\right| + c$

D. $\log_e\left|\frac{x^6+4}{x^6-1}\right| + c$

Answer: B

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155. $\int \frac{dx}{x+\sqrt{x-1}} =$

A. $\log_e\left|x+\sqrt{x-1}\right| - \frac{1}{\sqrt{3}}\tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right) + c$

B. $\frac{1}{\sqrt{3}}\log_e\left|x+\sqrt{x-1}\right| - \tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right) + c$

C. $\frac{2}{\sqrt{3}}\log_e\left|x+\sqrt{x-1}\right| - \tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right) + c$

D. $\log_e\left|x+\sqrt{x-1}\right|-\frac{2}{\sqrt{3}}\tan^{-1}\left(\frac{2\sqrt{x-1}+1}{\sqrt{3}}\right)+c$

Answer: D

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156. $\int_{\log 2}^{t}\frac{dx}{\sqrt{e^x-1}}=\frac{\pi}{6}$, then t=

A. $2.\log_e 2$

B. $3.\log_e 2$

C. $4.\log_e 2$

D. $8.\log_e 2$

Answer: A

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157. $\int_0^1\frac{\log_e(1+x)}{1+x^2}dx=$

A. $\frac{\pi}{4}\log_e 2$

B. $\frac{\pi}{6}\log_e 6$

C. $\frac{\pi}{2}\log_e 8$

D. $\frac{\pi}{8}\log_e 2$

Answer: D

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158. IF the area of the circle $x^2 + y^2 = 2$ is divided into two parts by the parabola $y = x^2$, then the area (in sq units) of the larger part is

A. $\frac{3\pi}{2} - \frac{1}{3}$

B. $6\pi - \frac{4}{3}$

C. $\frac{4\pi}{3} - \frac{2}{3}$

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

Answer: A

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159. If c is a parameter, then the differential equation of the family of curves $x^2 = c(y+c)^2$ is

A. $x\left(\frac{dy}{dx}\right)^3 + y\left(\frac{dy}{dx}\right)^2 - 1 = 0$

B. $x\left(\frac{dy}{dx}\right)^3 - y\left(\frac{dy}{dx}\right)^2 + 1 = 0$

C. $x\left(\frac{dy}{dx}\right)^3 + y\left(\frac{dy}{dx}\right)^2 + 1 = 0$

D. $x\left(\frac{dy}{dx}\right)^3 - y\left(\frac{dy}{dx}\right)^2 - 1 = 0$

Answer: D

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160. IF f(x), f'(x) f''(x) are positive functions and f(0)=1, f')0)=2 then the solution of the differential equation $\begin{vmatrix} f(x) f'(x) \\ f'(x) f''(x) \end{vmatrix} = 0$ is

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161. Let A and B be finite sets and P_A and P_B respectively denote their power sets . If P_B has 112. elements more than those in P_A then the number of functions from A to B which are injective is

A. 224

B. 56

C. 120

D. 840

Answer: D

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162. Let $D = \left\{ x \in R : f(x) = \sqrt{\frac{x - |x|}{x - |x|}} \text{is difined} \right\}$

and C be the range of the real function

$g(x) = \frac{2x}{4 + x^2}. \text{ then} D \cap C =$

A. $\left[-\frac{1}{2}, \frac{1}{2} \right]$

B. $\left(0, \frac{1}{2}\right)$

C. R^{+}

D. $R^{+} - Z^{+}$

Answer: B

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163. which of the following is divisible by $x^2 - y^2 \, \forall x \neq y$?

A. $x^n - y^n, \ \forall n \in N$

B. $x^n + y^n, \ \forall n \in N$

C. $(x^n - y^n)\left(x^{2n+1} + y^{2n+1}\right), \ \forall n \in N$

D. $(x^n - y^n)(x^m + y^m), \ \forall m, n \in N$

Answer: C

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164. If A = $\begin{vmatrix} p & q & r \\ r & p & q \\ q & r & p \end{vmatrix}$ and $AA^T = I \text{then} p^3 + q^3 + r^3$ =

A. ± 1

B. pqr

C. 3pqr

D. $3pqr \pm 1$

Answer: D

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165. Match the items of List-I with the items of List - II and choose the correct option.

List I		List II
A. If A is a non singular matrix of order 3 and $\|A\| = a$, then $\|(\text{adj } A^{-1})^{-1}\| =$	I.	null matrix
B. A is a non singular matrix of order 3 and B is any matrix of order 3 such that $AB = O$, then B is	II.	a^2
C. $\begin{vmatrix} 1 & x & x^2 \\ \cos(a-b)y & \cos ay & \cos(a+b)y \\ \sin(a-b)y & \sin ay & \sin(a+b)y \end{vmatrix}$ does not depend on	III.	b
D. A is a square matrix of order 3 and $B = A - A^T$, then $\|B\|$ is	IV.	a
	V.	0

A. $\begin{matrix} A & B & C & D \\ II & IV & III & I \end{matrix}$

B. $\begin{matrix} A & B & C & D \\ III & I & IV & V \end{matrix}$

C. $\begin{matrix} A & B & C & D \\ II & V & III & I \end{matrix}$

D. $\begin{matrix} A & B & C & D \\ II & I & IV & V \end{matrix}$

Answer: D

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166. The solution of the linear system of equations

$$\begin{bmatrix} 2 & 2 & 3 \\ 7 & 1 & 1 \\ 0 & 6 & 5 \end{bmatrix}\begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 3y+11 \\ 6z-1 \\ 5y+11 \end{bmatrix} + \begin{bmatrix} x \\ x \\ 4z \end{bmatrix} + \begin{bmatrix} z \\ 3x \\ 4y \end{bmatrix} is$$

A. x = 4, y = - 3, z = - 2

B. x = 2, y = 1, z=1

C. x = 1, y=-1, z = 2

D. x = 2, y = - 4, z = 3

Answer: A

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167. If a b, are the least and the greatest values respectively $|z_1 + z_2|$, where $z_1 = 12 + 5i$ and $|z_2| = 9, then a^2 + b^2$ =

A. 468

B. 500

C. 250

D. 450

Answer: B

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168. If a complex number z is such that $(7+i)(z+\bar{z})-(4+i)(z-\bar{z})+116i=0$, then $z \cdot \bar{z}=$

A. 400

B. 300

C. 200

D. 100

Answer: C

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169. Let the point P pepresent $z = x + iy, x, y \in R$ in the argand plane .

Let the curves C_1 and C_2 be the loci of P satisfying the conditions

(i) $\frac{2z+i}{z-2}$ is purely imaginary and

$(ii) Arg\left(\frac{z+i}{z+1}\right) = \frac{\pi}{2}$ respectively . Then the point of intersection of the curves C_1 and C_2 , other than the origin, is

A. (1,2)

B. $\left(\frac{2}{7}, -\frac{5}{7}\right)$

C. $(-3, 4)$

D. $\left(\frac{5}{37}, -\frac{30}{37}\right)$

Answer: D

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170. If $z = \cos 6^\circ + i\sin 6^\circ, \quad \text{then} \sum_{n=1}^{20} \left(z^{2n-1}\right) =$

A. 0

B. -1

C. $\frac{-3}{4\sin 6^{\circ}}$

D. $\frac{3}{4\sin 6^{\circ}}$

Answer: D

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171. If α, β are the real roots of $x^2 + px + q = 0$ and α^4, β^4 are the roots of $x^2 - rx + s = 0$, then the equation $x^2 - 4qx + 2q^2 - r = 0$ has always

A. two positive roots

B. two negative roots

C. one positive root and one negative root

D. two real roots

Answer: D

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172. If $\frac{x-p}{x^2-3x+2}$ takes all real values for $x \in R$ then the range of P is

A. $1 \leq P \leq 2$

B. $1 < P < 2$

C. $P < 1 \text{ or } P > 2$

D. $P \geq 2 \text{ or } P \leq 1$

Answer: A

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173. $\left\{x \in R: \frac{\sqrt{6+x-x^2}}{2x+5} \geq \frac{\sqrt{6+x-x^2}}{x-4}\right\} =$

A. [-2,3]

B. $(-\infty, -4] \cup \left[\frac{-5}{2}, -1\right]$

C. $[-2, -1] \cup \{3\}$

D. $(-\infty, -4] \cup [-2, -1]$

Answer: C

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174. Let θ be a an acute angle such that the equation $x^3 + 4x^2 \cos\theta + x \cot\theta = 0$ has multiple roots. Then the value of θ (in radians) is

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

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

C. $\frac{\pi}{12}$ or $\frac{5\pi}{12}$

D. $\frac{\pi}{6}$ or $\frac{5\pi}{12}$

Answer: C

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175. six persons A, B, C, D, E and F are to be seated at a circular table facing towards the centre. Then the number of ways that can be done if A must have either E or F on his immediate right and E must have either F or D on his immediate right, is

A. 18

B. 30

C. 12

D. 24

Answer: A

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176. Number of ways of forming a committee of 6 members out of 5 Indians. 5 Americans and 5 Australians such that there will be atleast one member from each county in the committee is

A. 3375

B. 4375

C. 3875

D. 4250

Answer: B

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177. If 'a' the middle term in the expansion of $(2x - 3y)^8$ and b,c are the middle terms in the expansion of $(3x + 4y)^7$, then the value of $\frac{b+c}{a}$, when x = 2 and y = 3 , is

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

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

C. 1

D. 2

Answer: D

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178. The first negative coefficient in the terms occurring in the expansion of $(1+x)^{\frac{21}{5}}$ is

A. $\frac{-6160}{15625}$

B. $\frac{-416}{3125}$

C. $\frac{-616}{5^7}$

D. $\frac{-616}{5^6}$

Answer: C

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179. When $|x| < \frac{1}{2}$, the coefficient of x^4 in the expansion of $\frac{3x^2-5x+3}{(x-1)(2x+1)(x+3)}$ is

A. $\frac{722}{27}$

B. $\frac{724}{27}$

C. $\frac{-722}{27}$

D. $\frac{-724}{27}$

Answer: C

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180. Let

$x = a\sin^{\alpha}\theta\cos^{\alpha+1}\theta,\ y = a\sin^{\alpha+1}\theta\cos^{\alpha}\theta,\ \left(\theta \neq \frac{n\pi}{2}\right)$. If $\frac{\left(x^2+y^2\right)^m}{(xy)^n}$

is independent of θ, then the relation between α m and n is

A. $2m\alpha = n(2\alpha + 1)$

B. $m + n = \alpha$

C. $2m\alpha = 2n\alpha + m$

D. $2m = (2n + 1)\alpha$

Answer: A

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181. Assertion (A) : If $\sqrt{4\sin^4\theta+\sin^2 2\theta}+4\cos^2\left(\frac{\pi}{4}-\frac{\theta}{2}\right)=2$, then θ lies in 3rd quadrant or 4th quadrant .

Reason : (R) $\sqrt{\sin^2\theta}=\sin\theta$

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

B. Both (A) and (R) 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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182. If $x=\frac{\sin^3\theta}{\cos^2\theta}$ and $y=\frac{\cos^3\theta}{\sin^2\theta}$, where $\sin\theta+\cos\theta=\frac{1}{2}$, then $x+y=$

A. $\frac{48}{9}$

B. $\frac{34}{9}$

C. $\frac{65}{18}$

D. $\frac{79}{18}$

Answer: D

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183. If 4 $\left(\sin 2x \sin 4x + \sin^2 x\right) = 3$, then x =

A. $\frac{2n\pi}{3} \pm \frac{\pi}{9}, n \in Z$

B. $\frac{n\pi}{3} \pm \frac{\pi}{9}, n \in Z$

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

D. $\frac{n\pi}{3} + (-1)^n \frac{2\pi}{9}, n \in Z$

Answer: B

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184. If $\sum_{k=1}^{n}\tan^{-1}\left(\frac{1}{k^2+k+1}\right)=\tan^{-1}(\theta), \quad \text{then} \quad \theta=$

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

B. $\frac{n}{n+1}$

C. 1

D. $\frac{n}{n-1}$

Answer: A

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185. $e^{\left(\sec h^{-1}\frac{1}{2}+\tan h^{-1}\frac{1}{2}+\sin h^{-1}\frac{1}{2}\right)}=$

A. $\frac{2+3\sqrt{3}+3\sqrt{5}+3\sqrt{15}}{2}$

B. $\frac{3+2\sqrt{3}+3\sqrt{5}+2\sqrt{15}}{2}$

C. $\frac{2=3\sqrt{3}+4\sqrt{5}+5\sqrt{15}}{2}$

D. $\dfrac{2+3\sqrt{3}-4\sqrt{5}+5\sqrt{15}}{2}$

Answer: B

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186. In ΔABC if a: b: c = 3 : 5: 7 , then , cos A + cos B =

A. $\dfrac{13}{7}$

B. $\dfrac{11}{7}$

C. $\dfrac{12}{7}$

D. $\dfrac{10}{7}$

Answer: C

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187. If ABCD is a cyclic quadrilateral with AB = 6 , BC = 4, CD = 5, DA= 3 and $\angle ABC = \theta$, then cos θ =

A. A $\frac{3}{13}$

B. B $\frac{18}{76}$

C. C $\frac{16}{78}$

D. D $\frac{78}{86}$

Answer: A

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188. Let a triangle ABC be inscribed in a circle of radius 2 units. If the 3 bisectors of the angles A, B and C are extended to cut the circle at A_1, B_1 and C_1 respectively, then the value of

$$\left[\frac{AA_1 \cos\frac{A}{2} + BB_1 \cos\frac{B}{2} + CC_1 \cos\frac{C}{2}}{\sin a + \sin B + \sin C}\right]^2 =$$

A. 4

B. 16

C. 25

D. 1

Answer: B

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189. Let D and E be the midpoints of the sides AC and BC of a triangle ABC respectively . If O is an interior point of the triangle ABC such that OA + 2OB + 3OC = 0 , then the area (in sq units) of the triangle ODE is

A. 6

B. 5

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

D. 0

Answer: D

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190. The vector equation of the plane passing through the points $(1, -2, 5), (0, -5, -1)$ and $(-3, 5, 0)$ is

A. $r = (1 - \lambda - 4\mu)\hat{i} - (2 + 3\lambda - 7\mu)\hat{j} + (5 - 6\lambda - 5\mu)\hat{k}$

B. $r = (1 + \lambda + 4\mu)\hat{i} - (2 - 3\lambda + 7\mu)\hat{j} + (5 - 6\lambda - 5\mu)\hat{k}$

C. $r = (1 - \lambda + 4\mu)\hat{i} - (2 + 3\lambda + 7\mu)\hat{j} + (5 - 6\lambda + 5\mu)\hat{k}$

D. $r = (1 + \lambda - 4\mu)\hat{i} + (2 + 3\lambda - 7\mu)\hat{j} + (5 + 6\lambda - 5\mu)\hat{k}$

Answer: A

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191. The angle made by the vector $2\hat{i} - \hat{j} + \hat{k}$ with the plane represented by $r \cdot \left(\hat{i} + \hat{j} + 2\hat{k}\right)$ = 7 is

A. 30°

B. 60°

C. 45°

D. 75°

Answer: A

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192. If a, b, c are non-zero , non-collinear vectors and $a \times b = b \times c = c \times a$, then a + b+ c =

A. 3a

B. 0

C. $3(a \times b)$

D. $3(b \times c)$

Answer: B

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193. If $V = 2\hat{i} + \hat{j} - \hat{k}, W = \hat{i} + 3\hat{k}$ and U is a unit vector , then the maximum value of [U V W] is

A. $\sqrt{57}$

B. $\sqrt{59}$

C. $\sqrt{60}$

D. $\sqrt{10} + \sqrt{6}$

Answer: B

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194. Assertion (A) : If a, b are two non collinear vectors, then the vector component of b along the line perpendicular to a is $\dfrac{a \times (b \times a)}{|a|^2}$

Reason (R) : $a \times (b \times c) = (a.\, c)b - (a.\, B)c$ and vector component of b on c is $\left(b \cdot \dfrac{c}{|c|}\right)\dfrac{c}{|c|}$

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: A

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195. The standard deviations of $x_i (i = 1, 2, \ldots, 10)$ and $y_i (i = 1, \ldots, 10)$ are respectively 'a' and 'b' . $\bar{x}, \bar{y}$ are the means of these two sets of observation respectively . If $z_i = (x_i - \bar{x})(y_i - \bar{y})$ and $\sum_{i=1}^{10} z_i = c$ then the standard deviations of the observation $= (x_i - y_i), (i = 1, 2, \ldots, 10)$ is

A. $\sqrt{a^2 + b^2 + \frac{c}{5}}$

B. $\sqrt{a^2 + b^2 - \frac{c}{5}}$

C. $\sqrt{a^2 + b^2 - \frac{c^2}{5}}$

D. $\sqrt{a^2 + b^2 + \frac{c^2}{5}}$

Answer: B

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196. For a group of 100 students, the mean $\bar{x}_1$ and the standard deviation σ_1 of their marks were found to be 40 and 15 respectively. Later it was observed that the scores 40 and 50 were misread as 30 and 60 respectively. If the mean and the standard deviation with the corrected observations of the scores, are $\bar{x}_2$ and σ_2 respectively , then

A. $\bar{x} = \bar{x}_2, \sigma_1 = \sigma_2$

B. $\bar{x}_1 = \bar{x}_2, \sigma_1 < \sigma_2$

C. $\bar{x}_1 = \bar{x}_2, \sigma_1 > \sigma_2$

D. $\bar{x}_1 > \bar{x}_2, \sigma_1 = \sigma_2$

Answer: C

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197. If two unbiased dice are rolled simultaneously unitl a sum of the number appered on these dice is either 7 or 11, then the probability that 7 comes before 11, is

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

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

C. $\frac{5}{9}$

D. $\frac{5}{18}$

Answer: B

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198. If A and B throw two dice 100 times each simultaneously, then the probability that both of them will get even number as the total at the same time in all the throws is

A. $\left(\frac{1}{6}\right)^{100}$

B. $\left(\frac{1}{4}\right)^{100}$

C. $\left(\frac{1}{2}\right)^{100}$

D. $\left(\frac{3}{4}\right)^{100}$

Answer: A

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199. The probabilities of having a defective toy in three cartons , A , B, C are $\frac{1}{3}, \frac{1}{4}, \frac{2}{5}$ respectively. If a carton is selected at random and a toy drawn randomly from it is found to be defective, then probability that it is drawn from carton B is

A. $\frac{15}{47}$

B. $\frac{20}{47}$

C. $\frac{20}{59}$

D. $\frac{15}{59}$

Answer: D

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200. A die is thrown twice. If getting a number greater than four on the die is considered a succes. Then the variance of the probability distribution of the number of successes is

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

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

C. $\frac{4}{9}$

D. $\frac{8}{9}$

Answer: C

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201. If X is a poisson variate such that 2P(X = 1) = 5P (X = 5)+(2P(X = 3), then the standard deviation of X is

A. 4

B. 2

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

D. $\sqrt{2}$

Answer: D

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202. If the sum of the distance from a variable point P to the given points A(1,0) and B(0,1) is 2, then the locus of P is

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

B. $16x^2 + 7y^2 - 64x - 48y = 0$

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

D. $16x^2 + 38xy + 7y^2 - 64x - 48y = 0$

Answer: C

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203. If the equation of a curve C is transformed to $9x^2 + 25y^2 = 225$ be the rotation of the coordinate axes about the origin through an angle $\frac{\pi}{4}$ in the positive direction then the equation of the curve C, before the transformation is

A. $17x^2 + 16xy + 17y^2 = 225$

B. $17x^2 + 23y^2 = 391$

C. $17x^2 - 16xy + 17y^2 = 225$

D. $23x^2 + 17y^2 = 391$

Answer: C

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204. A straight line 4x +y -1 = 0 through the point A(2,-7) meets the line BC whose equation is 3x - 4y +1 at the point B . Then the equation of the line AC such that AB = AC , is

A. 89x - 52y - 162 = 0

B. 52x + 89y + 519 = 0

C. 4x - y - 15 = 0

D. 4x +3y +13 = 0

Answer: B

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205. In a $\Delta ABC, 2x+3y+1=0, x+2y-2=0$ are the perpendicular bisectors of its sides AB a nd AC respectively and if A = (3,2) , then the equation of the side BC is

A. x + y - 3 = 0

B. x - y - 3 = 0

C. 2x - y - 2 = 0

D. 2x + y - 2 = 0

Answer: B

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206. If the perpendicular bisector of the line segment joining $A(\alpha, 3)$ and B(2,-1) has y-intercept 1, then $\alpha =$

A. 0

B. ± 1

C. ± 2

D. ± 3

Answer: C

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207. the number of values of a for which the pair of lines represented by $3ax^2 + 5xy + (a^2 - 2)y^2 = 0$ are at right angles to each other , is

A. 2

B. 1

C. infinitely many

D. 0

Answer: A

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208. If the pair of lines joining the origin and the points of intersection of the line ax +by = 1 and the curve $x^2 + y^2 - x - y - 1 = 0$ are at right angles , then the locus of he point (a,b) is a circle of radius

A. 2

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

C. $\sqrt{\frac{5}{2}}$

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

Answer: C

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209. If the lines $x + 2y - 5 = 0$ and $2x - 3y + 4 = 0$ lie along diameters of a circle of area is 9π then the equation of the circle is

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

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

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

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

Answer: A

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210. Given that $a > 2b > 0$ and that the line $y = mx - b\sqrt{1 + m^2}$ is a common tangent to the circles $x^2 + y^2 = b^2$ and $(x - a)^2 + y^2 = b^2$.

Then the positive value of m is

A. $\frac{2b}{a - 2b}$

B. $\frac{b}{a - 2b}$

C. $\frac{\sqrt{a^2 - 4b^2}}{2b}$

D. $\frac{2b}{\sqrt{a^2 - 4b^2}}$

Answer: D

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211. Two circles each of radius 5 units touch each other at (1,2) and 4x +3y = 10 is their common tangent. The equation of that circle among the two given circles, such that some portion of it lies in every quadrant is

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

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

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

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

Answer: C

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212. If the angle between the circles $x^2 + y^2 + 4x - 5 = 0$ and $x^2 + y^2 + 2\lambda y - 4 = 0$ is $\frac{\pi}{3}$, then $\lambda =$

A. $\pm\sqrt{5}$

B. ± 2

C. $\pm\sqrt{3}$

D. $\pm\sqrt{6}$

Answer: A

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213. The equation of a circle passing through the points of intersection of the circles

$x^2 + y^2 - 4x - 6y - 12 = 0$

$x^2 + y^2 + 6x + 4y - 12 = 0$ and having radius $\sqrt{13}$ is

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

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

C. $x6(2) + y^2 - 2y - 13 = 0$

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

Answer: D

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214. The normal at a point on the parabola $y^2 = 4x$ passes through (5,0). If two more normals to this parabola also pass through(5,0) , then centroid of the triangle formed by the feet of these three normal is

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

B. $(2, 0)$

C. (5,0)

D. (0,2)

Answer: B

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215. The equation of the normal to the parabola $y^2 = 4x$ which is perpendicular to x + 3y +1 = 0 is

A. 3x - y = 33

B. 3x - y +33 = 0

C. 3x + y = 33

D. 3x + y + 33 = 0

Answer: A

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216. Let P be any point on the ellipse $7x^2 + 16y^2 = 112$, S be a focus , L be the corresponding directrix and PM be the perbendicular distance from P directrix L . Then $\frac{SP}{PM}$

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

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

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

D. $\frac{1}{\sqrt{2}}$

Answer: C

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217. Tangents are drawn to the ellipse $\frac{x^2}{9}+\frac{y^2}{5}=1$ at the ends of latus rectum. The area of the quadrilateral formed, is

A. 27

B. $\frac{15}{4}$

C. $\frac{13}{2}$

D. 45

Answer: A

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218. A hyperbola with centre at (0,0) has its transverse axis along X - axis whose length is 12 if (8,2) is a point on the hyperbola , then its eccentricity is

A. $\frac{8}{7}$

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

C. $\frac{3}{\sqrt{7}}$

D. $\frac{9}{7}$

Answer: B

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219. In a triangle ABC , if the mid-points of sides AB, BC, CA are (3,0,0), (0,4,0),(0,0,5) respectively, then $AB^2 + BC^2 + CA^2 =$

A. 50

B. 200

C. 300

D. 400

Answer: D

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220. The angle between a line with direction ratios 2,2,1 and the line joining the points (3,1,4) and (7,2,12) is

A. $\cos^{-1}\left(\frac{2}{3}\right)$

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

C. $\tan^{-1}\left(\frac{-2}{3}\right)$

D. $\cos^{-1}\left(\frac{1}{3}\right)$

Answer: A

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221. The equation of the plane in normal form which passes through the points (-2,1,3) ,(1,1,1) and (2,3,4) is

A. $\left(\frac{2}{3}\right)x + \left(-\frac{2}{3}\right)y + \left(\frac{1}{3}\right)x = \frac{1}{3}$

B. $\left(-\frac{2}{3}\right)x + \left(\frac{2}{3}\right)y + \left(-\frac{1}{3}\right)x = \frac{1}{3}$

C. $\left(-\frac{2}{3}\right)x + \left(\frac{2}{3}\right)y + \left(-\frac{1}{3}\right)x = \frac{1}{3}$

D. $\left(\frac{4}{\sqrt{173}}\right)x+\left(\frac{-11}{\sqrt{173}}\right)y+\left(\frac{6}{\sqrt{173}}\right)x=\frac{1}{\sqrt{173}}$

Answer: C

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222. If $\alpha=\lim_{x\to 0}\frac{x\cdot 2^x-x}{1-\cos x}$ and $\beta=\lim_{x\to 0}\frac{x\cdot 2^x-x}{\sqrt{1+x^2}-\sqrt{1-x^2}}$ then

A. $\alpha=5\beta$

B. $\alpha=2\beta$

C. $\beta=2\alpha^2$

D. $\beta=\frac{1}{6}\alpha$

Answer: B

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223. $\lim_{n\to\infty}\left(\frac{1}{3.7}+\frac{1}{7.11}+\frac{1}{11.15}+\ldots+(n \text{ terms })\right)=$

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

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

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

D. 0

Answer: A

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224. $\lim_{x \to \infty} \left[\sqrt{x^2 + ax + b} - x\right](a < 0 < b)$

A. depends on both a nad b

B. depends only on b

C. depends only on a

D. does not depend on a and b

Answer: C

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225. If α and β are such that the function f (x)

defined by f (x) = $\begin{cases} \alpha x^2 - \beta, & \text{for} |x| < 1 \\ \frac{-1}{|X|}, & \text{for} |x| \geq 1 \end{cases}$

is differentiable everywhere, then the ordered pair (α, β) =

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

B. $\left(\frac{1}{2}, -\frac{3}{2}\right)$

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

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

Answer: C

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226. If y = $\sin^2\left(\cot^{-1}\sqrt{\frac{1+x}{1-x}}\right)$, then $\frac{dy}{dx}$ =

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

B. $\frac{1}{1+x}$

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

D. 1

Answer: A

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227. If

$a \neq b, x \neq n\pi n \in Z$ and $y^2 = a^2 \cos^2 x + b^2 \sin^2 x$, then $\frac{d^2y}{dx^2} + y =$

A. $\left(\frac{ab}{y}\right)^2$

B. $\frac{1}{y}\left(\frac{ab}{y}\right)^2$

C. $\frac{(ab)^2}{y}$

D. $\frac{ab}{y^3}$

Answer: B

View Text Solution

228. If 2y = 3 x - 1 is a tangent drawn to the curve $y^2 = ax^3 + b$ at (1.1) where a, b are constatns then (a,b) =

A. (1,0)

B. (0,1)

C. (1,-1)

D. (-1,1)

Answer: A

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229. A ladder of 5 meters long rests against a vertical wall with the lower end on the horizontal ground.

. The lower end of the ladder is pulled along the ground away from the wali at the rate 3m/sec. The height of the upper end (in meters) while it is descending at the rate of 4m/sec, is

A. 1

B. 2

C. 3

D. 4

Answer: C

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230. Suppose f''(x) exists for all real x. if f(2) = 2, f(3) = 5 and f(4) = 10, then which one among the following statements is definitely true?

A. $f''(x) < 1 \text{ for some } x \in (2, 4)$

B. $f''(x) > 1 \text{ for some } x \in (2, 4)$

C. $f''(x) = 1 \text{ for some } x \in (2, 4)$

D. $f''(x) = 0 \text{ for some } x \in (2, 4)$

Answer: B

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231. If p and q are respectively the global maximum and global minimum of the function f(x) $= x^2 e^{2x}$ on the interval [-2,2], then $pe^{-4} + qe^4 =$

A. 0

B. $4e^8$

C. 4

D. $4e^8 + 1$

Answer: C

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232. $\int \frac{x + \sin x}{1 + \cos x} dx =$

A. $\log_e(1 + \cos x) + c$

B. $x \frac{\sin^2(x)}{2} + c$

C. $\tan\frac{x}{2}+c$

D. $x\tan\frac{x}{2}+c$

Answer: D

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233. $\int x^2\left[\sqrt{2}\left(\frac{\pi}{4}+x\right)+e^x\right]dx=$

A.

$(x^2+2x-2)\sin x+(-x^2+2x+2)\cos x+(x^2-2x+2)e^x+c$

B.

$(-x^2+2x+2)\sin x+(x^2+2x-2)\cos x+(x^2-2x+2)e^x+c$

C.

$(x^2+2x+2)\sin x+(-x^2-2x-2)\cos x+(x^2-2x+2)e^x+c$

D.

$(x^2-2x-2)\sin x+(-x^2+2x-2)\cos x+(x^2-2x+2)e^x+c$

Answer: A

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234. $\int \frac{dx}{(x-1)^2(x^2+1)} =$

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

B. $\log_e \sqrt{x+1} - \frac{1}{2}\log_e \sqrt{x^2+1} - \frac{1}{2(x+1)} + c$

C. $\frac{1}{2}\log_e \sqrt{x+1} - \frac{1}{4}\log_e \sqrt{x^2+1} + \frac{1}{2(x-1)} + c$

D. $\frac{1}{4}\log_e \sqrt{x+1} + \frac{1}{2}\log_e \sqrt{x^2+1} + \frac{1}{x+1} + c$

Answer: B

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235. For

$n \geq 2, \quad \text{if} \quad I_n = \int (\sin x + \cos x)^n dx \quad \text{then} \quad nI_n - 2(n-I)I_{n-2} =$

A. $(\sin x + \cos x)^{n+1}(\sin x - \cos x) + c$

B. $(\sin x + \cos x)^{n}(\sin x - \cos x) + c$

C. $(\sin x + \cos x)^{n-1}(\sin x - \cos x) + c$

D. $(\sin x - \cos x)^{n-1}(\sin x + \cos x) + c$

Answer: C

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236. $\lim_{n \to \infty} \dfrac{\sqrt{1} + \sqrt{2} + \ldots + \sqrt{n}}{n^{3/2}} =$

A. 0

B. $\dfrac{2}{3}$

C. 1

D. $\dfrac{3}{2}$

Answer: B

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237. $\int_0^\infty e^{-x} \sin^6 x dx =$

A. $\frac{24}{85}$

B. $\frac{124}{285}$

C. $\frac{136}{529}$

D. $\frac{144}{629}$

Answer: D

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238. The area (in sq. units) bounded by the curve $y = x^2 + 2x + 1$ and the tangent to it at (1,4) and the y -axis is

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

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

C. 1

D. $\frac{7}{3}$

Answer: A

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239. The differential equation formed by eliminating a and b from the equation $y = e^x$ (a cos x + b sin x) is

A. $2\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2y = 0$

B. $2\frac{d^2y}{dx^2} + 2\frac{dy}{dx} - 2y = 0$

C. $2\frac{d^2y}{dx^2} - \frac{dy}{dx} + 2y = 0$

D. $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 2y = 0$

Answer: D

View Text Solution

240. If $y = A(x)e^{-\int pdx}$ is a solution of $\frac{dy}{dx} + P(x)y = Q(x)$, then A'(x)

=

A. $e^{\int pdx}$

B. $Q(x)e^{-\int pdx}$

C. $\int Q(x)e^{\int pdx}dx$

D. $Q(x)e^{\int pdx}$

Answer: D

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241. if f:R $\rightarrow$ R is defined bty

$$f(x) = \begin{cases} |[x-5]| & \text{for} x < 5 \\ [|x-5|] & \text{for} x \geq 5 \end{cases}$$

Then (fof)$\left(-\frac{7}{2}\right)$=

(here [x] is the greatest integer not exceeding x)

A. $(fof)\left(-\frac{11}{2}\right)$

B. $(fof)\left(-\frac{9}{2}\right)$

C. $(fof)(3)$

D. $(fof)\left(\frac{9}{2}\right)$

Answer: D

View Text Solution

242. If f:A $\rightarrow$ B is an on to function such that f(x)= $\sqrt{|x|-x}+\frac{1}{\sqrt{|x|-x}}$ then A and B are respectively

A. $(-\propto, \infty), (0, \infty)$

B. $(-\propto 0), [2, \infty)$

C. $(0, \infty), (2, \infty)$

D. $(-\infty, 0\}(0, \infty)$

Answer: B

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243. $\frac{1}{2.5}+\frac{1}{5.8}+\frac{1}{8.11}+\ldots.16$ terms =

A. $\frac{4}{25}$

B. $\frac{8}{25}$

C. $\frac{16}{25}$

D. $\frac{1}{25}$

Answer: A

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244. If $f(x)=\begin{vmatrix}1+\sin^2 x & \cos^2 x & 4\sin 2x \\ \sin^2 x & 1+\cos^2 x & 4\sin 2x \\ \sin^2 x & \cos^2 x & 1+4\sin 2x\end{vmatrix}$ then the maximum value of $f(x)$ is

A. 0

B. 2

C. 4

D. 6

Answer: D

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245. If $A = \begin{bmatrix} 1 & 0 & -2 \\ -2 & -1 & 2 \\ 3 & 4 & 1 \end{bmatrix}$ then A^{-1} =

A. $A^2 - 2A - 4l$

B. $A^2 - A - 3I$

C. $\frac{1}{2}\left[A^2 + A + 2l\right]$

D. $A^2 + A - 2l$

Answer: B

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246. If the system of simultaneous linear equations x+y+z=a,x-y+bz=2, 2x+3y -z=1 has infinitely many solutions then b-5a=

A. $\frac{4}{5}$

B. 3

C. 7

D. -3

Answer: B

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247. If z=x +iy,x,y $\in$ R and if the point p in the agrand plane represents z then the locus of p satisfying the condition arg $\frac{z-1}{z-3i}=\frac{\pi}{2}$ is

A. $\left\{Z \in C / \left|Z-\frac{1+3l}{2}\right|=\frac{\sqrt{10}}{2}\right\}$

B. $\{Z \in /C(3-i)Z+(3+i)\overline{Z}-6=0\}$

C. $\left\{Z \in C / (3-i)Z+(3+l)\overline{Z}-6>0, \left|Z-\frac{1+3l}{2}\right|=\frac{\sqrt{10}}{2}\right\}$

D. $\left\{Z \in C / (3-i)Z + (3+l)\overline{Z} - 6 < 0, \left|Z - \frac{1+3l}{2}\right| = \frac{\sqrt{10}}{2}\right\}$

Answer: C

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248. If P,Q and R are points respectively representing the complex numbers z , $ze^{i\frac{\pi}{3}}$ and $z\left(1+e^{i\frac{\pi}{3}}\right)$ in agrand plane then area of the triangle PQR is

A. $\sqrt{3}|Z|^2$

B. $\frac{\sqrt{3}}{2}|Z|^2$

C. $\frac{\sqrt{3}}{4}|Z|^2$

D. $2\sqrt{3}|Z|^2$

Answer: C

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249. $A(z_1)$ and $B(z_2)$ are two points in the argand plane then the locus of the complex number z satisfying arg $\frac{z - z_1}{z - z_2} = 0$ or π is

A. the circle with $\overline{AB}$ as a diameter

B. the ellipse with A,B as extremities of the major axis

C. the perpendicular bisector of $\overline{AB}$

D. the straight line passing through the points A and B

Answer: D

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250. If x is a cube root of unity other than 1 then $\left(x + \frac{1}{x}\right)^2 + \left[x^2 + \frac{1}{x^2}\right]^2 + \ldots + \left[\left(x^{12}\right) + \frac{1}{x^{12}}\right]^2 =$

A. 12

B. 64

C. 24

D. 0

Answer: C

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251. If $3x^2 - 7x + 2 = 0$ and $15x^2 - 11x + a = 0$ have a common root and a is a positive real number then the sum of the roots of the equation $15x^2 - ax + 7 = 0$ is

A. $\frac{76}{15}$

B. $\frac{38}{15}$

C. $\frac{2}{15}$

D. $\frac{36}{15}$

Answer: C

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252. Let α, β be the roots of the equation $x^2 - |a|x - |b| = 0$ such that $|\alpha| < |\beta|$ if $|a| < \beta - 1$ then the positive root of $\log_{|\alpha|}\left[\frac{x^2}{\beta^2}\right] - 1 = 0$ is

A. $< |\alpha|$

B. $< \alpha$

C. $< \beta$

D. $> \beta$

Answer: D

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253. If x $\in$ R and $1 \leq \left(\frac{3x^2 - 7x + 8}{x^2 + 1}\right) \leq 2$ then the minimum and maximum values of x are respectively

A. $1, 2$

B. $5, 12$

C. $6, 10$

D. $1, 6$

Answer: D

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254. Let $\phi(x) = \frac{x}{x^2+1}(x+1)$ if a, b and c are the roots of the equation $x^3 - 3x + \lambda = 0 (\lambda \neq 0)$ Then $\phi(a)\phi(b)\phi(c)$ =

A. λ

B. $\frac{-\lambda}{(\lambda+2)(\lambda^2+16)}$

C. $\frac{\lambda}{(\lambda+2)}$

D. $\frac{\lambda}{(\lambda+2)(\lambda^2+16)}$

Answer: D

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255. In an examination hall there are 'mn' chairs in m rows and n columns the number of ways in which m students can be seated such that no row is vacant is

A. $m^n n!$

B. $n^m m!$

C. $m^m n!$

D. $n^n m!$

Answer: B

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256. Consider the folowing statements I:The number of non trivial even divisors of the number $2^{a_1}, 3^{a_2}, 4^{a_3}, 5^{a_4}, 6^{a_3}$ is

$a_2 + a_4 + a_5 + a_2 a_4 + a_4 a_5$ Then

A. I is false and II is false

B. Is true and II is true

C. I is false and II is true

D. I is true and II is false

Answer: C

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257. The coefficient of x^5 in the expansion of $\left(x^2 + 2x + 3\right)^5$ is

A. 1052

B. 540

C. 480

D. 1020

Answer: A

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258. If x is so small, that$x^5$and higher power of x may be neglected, then the coefficient of x^4 in the expansion of $\left[x^2+4\right]^{\frac{1}{2}}$ -$\left(x^2+9\right)^{\frac{1}{2}}$

A. $\dfrac{-19}{1728}$

B. $\dfrac{43}{1728}$

C. $\dfrac{-43}{1728}$

D. $\dfrac{43}{1728}$

Answer: B

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259. If $\dfrac{8}{(x+3)^2(x-2)}=\dfrac{Ax+B}{(x+3)^2}+\dfrac{C}{x-2}$ then 25(B+8C-A)=

A. 25

B. 1

C. 8

D. -8

Answer: C

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260. Let α, β and γ be such that $0 < \alpha < \beta < \gamma < 2\pi$ for any x $\in$ R if $\cos(x+\alpha)+\cos(x+\beta)+\cos(x+\gamma)=0$ then $\tan(\gamma-\alpha)$ =

A. $-\sqrt{3}$

B. 0

C. 1

D. $\sqrt{3}$

Answer: D

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261. If ABC is not a right andgled triangle and $\sin\left(\frac{\pi}{4}-A\right)\frac{\sin(\pi)}{4-B}=-(1)\left(2\sqrt{2}\right)\cos ec\left(\frac{\pi}{4}-C\right)$

then tan A tan B + tan B tan C + tan C tan A=

A. cot A + cot B + cot C

B. tan A + tan B + tan C

C. $\frac{1}{\tan \mathrm{A} + \tan \mathrm{B} + \tan \mathrm{C}}$

D. $\frac{1}{\cot \mathrm{A} + \cot \mathrm{B} + \cot \mathrm{C}}$

Answer: B

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262. If tan $\frac{\theta}{2} = \cos ec\theta - \sin\theta$ then $\tan^2\left(\frac{\theta}{2}\right) =$

A. $2 - \sqrt{5}$

B. $-2 + \sqrt{5}$

C. $2 + \sqrt{5}$

D. $\sqrt{2} + 5$

Answer: B

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263. The number of real values of

$x \in [0, 2\pi] - \left\{ \frac{\pi}{2}, \frac{3\pi}{2} \right\}$ satisfying the equation $|\cos x|^{2\sin^2 x - 3\sin x + 1}$=1

is

A. 3

B. 4

C. 5

D. 6

Answer: C

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264. The sum of the maximum and the minimum values of $2\left(\cos^{-1}x\right)^2 - \pi\cos^{-1}x + \frac{\pi^2}{4}$ is

A. $\frac{\pi^2}{8}$

B. $\frac{11\pi^2}{8}$

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

D. $4\pi^2$

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265. If y=$\log_e$ tan $\left(\frac{\pi}{4}+\frac{x}{2}\right)$ then tan h $\frac{y}{2}=$

A. $\cot\left(\frac{x}{2}\right)$

B. tan x

C. $\cot hx$

D. $\tan\left(\frac{x}{2}\right)$

Answer: D

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266. In $\triangle$ ABC if a,b and c are in arithmetic progression then cos A + 2cosB + cosC=

A. 1

B. 2

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

D. $\sqrt{3}+1$

Answer: B

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267. If the area of triangle ABC is $b^2-(c-a)^2$ then tan B=

A. 1

B. $\frac{13}{15}$

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

D. $\frac{8}{15}$

Answer: D

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268. $\frac{1}{r^2}+\frac{1}{r_1^2}+\frac{1}{r_2^2}+\frac{1}{r_3^2}$ equals

A. $\frac{a^2+b^2+c^2}{\Delta^2}$

B. $\frac{a+b+c}{\Delta^2}$

C. $\frac{S^2}{\Delta^2}$

D. $\frac{4s^2}{\Delta^2}$

Answer: A

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269. For a non zero real number x if the points with position vectors

$(x-u)\hat{i}+x\hat{j}+x\hat{k}, x\hat{i}+(x-v)\hat{j}+x\hat{k}, x\hat{i}+x\hat{j}+(x-w)\hat{k}$ and $(x-1)\hat{i}+(x-1)\hat{j}+(x-1)\hat{j}$ are coplanar then

A. $U+V+W=1$

B. $uvw=1$

C. $\frac{1}{u}+\frac{1}{v}+\frac{1}{w}=1$

D. $uv+vw+uw=1$

Answer: C

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270. If p is a point lying on the line passing throiugh the point $A\left(\hat{i}-\hat{j}+2\hat{k}\right)$ and parallel to the vector $2\hat{i}+\hat{j}=2\hat{k}$ such that |AP|=18 then a position vector of p is

A. $-13\hat{j}-5\hat{j}+9\hat{k}$

B. $11\hat{i}+7j-15\hat{k}$

C. $13\hat{i}-5\hat{j}+9\hat{k}$

D. $13\hat{I}+\hat{j}-9\hat{k}$

Answer: D

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271. a,b,c are three vectors such that |a|=1,|b|=2,|c |=3 and b.c =0 if the projection of b along a is equal to projecton of c along a then |2a+3b-3c|=

A. 3

B. $\sqrt{22}$

C. 9

D. 11

Answer: D

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272. Let m be a vector of magnitude $\sqrt{3}$ and perpendicular to the vectors $\hat{i}+\hat{j}$ and $\hat{j}-\hat{k}$ let n be another vector of magnitude $2\sqrt{6}$ and perpendicular to the vectors $2\hat{I}-\hat{j}$ and $\hat{j}+2\hat{k}$ The area in sq units of the triangle fromed with m and n side is

A. $\sqrt{2}$

B. $\sqrt{6}$

C. $2\sqrt{3}$

D. $3\sqrt{2}$

Answer: D

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273. $a=\hat{I}-\hat{j}+\hat{k}b=\hat{I}-2\hat{j}+\hat{k}, c=p\hat{I}+2\hat{j}+q\hat{k}$ and $d=p\hat{I}+q\hat{j}+2\hat{k}$ are given vectors if the projection of c on a is $5\sqrt{3}$

units and if a,b and c form a parallelopiped of volume 5 cubic units then

$\tan^{-1}(b, d) =$

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

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

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

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

Answer: C

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274. Given $a = 2\hat{i} + \hat{j} + \hat{k}, b = \hat{i} + 2\hat{j} - \hat{k}$ and a unit vector c are coplanar if c is perpendicular to a , then c=

A. A $\pm . \frac{1}{\sqrt{3}}\left(\hat{i} - \hat{j} - \hat{k}\right)$

B. B $\frac{1}{\sqrt{5}}\left(\hat{i} - 2\hat{j}\right)$

C. C $\frac{-1}{\sqrt{3}}\hat{i} + \hat{j} + \hat{k}$

D. D $\pm . \frac{1}{\sqrt{2}}\left(-\hat{j}+\hat{k}\right)$

Answer: D

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275. The coefficient of variation of 9,3,11,5,7 is

A. $\frac{100\sqrt{2}}{7}$

B. $\frac{200\sqrt{2}}{3}$

C. $\frac{200\sqrt{2}}{7}$

D. $\frac{100\sqrt{2}}{3}$

Answer: C

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276. The mean deviation about the mean for the following data

Marks obtained	0-10	10-20	20-30	30-40	40-50
Number of Boys	6	8	10	4	2

A. 9.33

B. 5.6

C. 8.33

D. 9.6

Answer: D

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277. The probability of occurrence of an event is $\frac{2}{5}$ and the probability of non occurrence of another event is $\frac{3}{10}$ if these events are independent then the probability that only one of the two events occurs is

A. $\frac{27}{25}$

B. $\frac{27}{50}$

C. $\frac{7}{25}$

D. $\frac{14}{25}$

Answer: B

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278. Let α be root of $x^2 + x + 1 = 0$ and suppose that a fair die is thrown 3 times if a,b and c are the numbers shown on the die then the probability that $\alpha^a + \alpha^b + \alpha^c$ =0 is

A. $\frac{2}{38}$

B. $\frac{1}{27}$

C. $\frac{1}{27}$

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

Answer: D

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279. Suppose that a bag a contains n red and 2 black balls and another bag B contains 2 red and n black balls one of the two bags is selected at random and two balls are dran from it at a time when it is known that the two balls drawn are red if the probability that those two balls drawn are from bag A is $\frac{6}{7}$ then n=

A. 6

B. 4

C. 8

D. 7

Answer: B

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280. A rondom variable X has its range {-1,0,1} if its mean is 0.2 and P(x=0) =0.2 then P(x=1) =

A. 0.1

B. 0.7

C. 0.4

D. 0.5

Answer: D

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281. There are 800 families with four children in each family Assuming equal channce for every child to be a boy or a girl the number of familes expected to have children of both sexes is

A. 700

B. 100

C. 500

D. 300

Answer: A

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282. A straight line meets the X and y axes at the points A,B respectively if AB=6 units then the locus of the point P which divides the line segment AB such that AP:PB =2 :1 is

A. $3x^2 + y^2 = 36$

B. $4x^2 + y^2 + 36$

C. $3x^2 + y^2 = 16$

D. $4x^2 + y^2 = 16$

Answer: D

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283. If the area of the region bounded by the curves y=x =x^2 and x = y^2 is k then the area of the region bounded by the curves

$$\frac{x+\sqrt{3y}}{2}=\frac{\sqrt{3x}-y^2}{2} \text{ and } \frac{\sqrt{3x}-y}{2}=\frac{\left(x+\sqrt{3y}\right)^2}{2} \text{ is}$$

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

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

C. k

D. $\left(\frac{\sqrt{3}+1}{2}\right)k$

Answer: C

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284. The set of values that β can assume so that the pont $(0, \beta)$ should lie on or inside the triangle having sides 3x+y+2=0 ,2x-3y+5=0 and x+4y-14=0 is

A. $\left[\frac{5}{3}, \frac{7}{2}\right]$

B. $\left[\frac{2}{3}, \frac{5}{2}\right]$

C. $\left[-\frac{1}{3}, \frac{2}{3}\right]$

D. $\left[\frac{1}{2}, \frac{5}{2}\right]$

Answer: A

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285. If $(\lambda^2, \lambda + 1)\lambda \in z$ belong to the region between the lines x+2y-5 =0 and 3x-y+1=0 which includes the origin then the possible number of such point is

A. 4

B. 3

C. 2

D. Infinite

Answer: C

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286. If the mid points of the sides BC, CA and AB of a triangle ABC are respectively (2,1) (-01,-2)and (3,3) then the equation of the side BC is

A. $x - 2y = 0$

B. $5x - 4y = 6$

C. $2x + 3y = 8$

D. $3x - 2y = 6$

Answer: B

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287. The distance between the pair of lines represented by

$x^2 + 2\sqrt{2}xy + 2y^2 + 4x + 4\sqrt{2}y + 1 = 0$, is

A. $4\sqrt{2}$

B. $2\sqrt{2}$

C. 2

D. $6\sqrt{2}$

Answer: C

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288. A pair of lines S =0 together with the lines given by the equation $8x^2 - 14xy + 3y^2 + 10x + 10y - 25 = 0$ form a parallelogram if its diagonals intersect at point (3,2) then the equation S=0 is

A. $6x^2 - 9xy + y^2 - 25x + 30y + 25 = 0$

B. $8x^2 - 14y + 3y^2 - 25x + 30y + 50 = 0$

C. $8x^2 - 14xy + 3y^2 - 50x + 50y + 75 = 0$

D. $6x^2 + 14xy - 3y^2 - 30x + 40y - 75 = 0$

Answer: C

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289. If the equation of the circle having its centre in the second quadrant touches the

corrdinate axes and also the line $\frac{x}{5} + \frac{y}{12} = 1$ is $x^2 + y^2 + 2\lambda x - 2\lambda y + \lambda^2 = 0$ then $\lambda =$

A. 3

B. 10

C. 15

D. -2

Answer: B

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290. The equation of circel passing throught the point (2,8) touching the lines

4x-3y-24=0 and 4x+3y-42=0 and having the x coordinate of its centre less than or equal to 8 is

A. $x^2 + y^2 + 2x - By - 8 = 0$

B. $x^2 + y^2 - 4x - 6y - 12 = 0$

C. $x^2 + y^2 + 4x - 10y + 4 = 0$

D. $x^2 + y^2 - 6x - 4y - 24 = 0$

Answer: B

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291. The point of intersecntion of the common tangents drawn to the circles

$x^2 + y^2 - 4x - 2y + 1 = 0$ and $x^2 + y^2 - 6x - 4y + 4 = 0$ is

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

B. $\left(\frac{6}{5}, \frac{1}{5}\right)$

C. $(0, \; -1)$

D. $\left(\frac{12}{5}, \frac{7}{5}\right)$

Answer: C

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292. The circle S=0 cuts the circle $x^2 + y^2 - 4x + 2y - 7 = 0$ orthogonally if (2,3) is the centre of the circle S=0 then its radius is

A. 2

B. 1

C. 3

D. 4

Answer: A

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293. The equation of the circle which cuts the circles

$S_1 = x^2 + y^2 - 4 = 0$

$S_2 = x^2 + y^2 - 6x - 8y + 10 = 0$

$S_3 = x^2 + y^2 + 2x - 4y - 2 = 0$

at the extremites of diameters of these circles is

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

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

C. $x^2 + y^2 = 25$

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

Answer: A

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294. The length of the latusrectum of the parabola $20(x^2 + y^2 - 6x - 2y + 10) = (4x - 2y - 5)^2$ is

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

B. $2\sqrt{5})$

C. $\sqrt{5}$

D. $4\sqrt{5}$

Answer: C

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295. y=3x-2 is a straight line touching the parabola $(-3)^2 = 12(x-2)$ if a line drawn perpendicular to this line at p on it touches the given parabola then the point p is

A. $(-1, -5)$

B. $(-1, 5)$

C. $(-2, -8)$

D. $(2, 4)$

Answer: A

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296. If (l,m) is the circumcentre of an equailateral triangle inscribed in the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$

having verticles at points with ecentric angles θ_1, θ_2 and θ_3 then $\frac{2}{3}[\cos(\theta_1-\theta_2)+\cos(\theta_2-\theta_3+\cos(\theta_3-\theta_1)]$ =

A. $\frac{9l^2}{2a^2}+\frac{9m^2}{b^2}-1$

B. $\frac{l^2}{a^2}+\frac{m^2}{b^2}-3$

C. $\frac{3l^2}{a^2}+\frac{3m^2}{b^2}-1$

D. $\frac{3l^2}{a^2}+\frac{3m^2}{b^2}-\frac{3}{2}$

Answer: C

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297. The sides of the rectangle of greatest area that can be inscribed in the ellipse $x^2 + 4y^2 = 64$ are

A. $(16\sqrt{2}, 4\sqrt{2})$

B. $(B\sqrt{2}, 6\sqrt{2})$

C. $(8\sqrt{2}, 4\sqrt{2})$

D. $(6\sqrt{2}, 4\sqrt{2})$

Answer: C

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298. If $2x - ky + 3 = 0, 3x - y + 1 = 0$ are conjugate lines with respect to $5x^2 - 6y^2 = 15$ then k=

A. 6

B. 4

C. 3

D. 2

Answer: A

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299. The points A(2,-1,4),B(1,0,-1),C(1,2,3) and D(2,1,8) form a

A. rectangle

B. square

C. rhombus

D. parallelogram

Answer: D

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