MATHS

BOOKS - JEE MAINS PREVIOUS YEAR

JEE MAINS 2020

Mathematics

1. Find the value $\left(\dfrac{1+\sin\left(\frac{2\pi}{9}\right)+i\cos\left(\frac{2\pi}{9}\right)}{1+\sin\left(\frac{2\pi}{9}\right)-i\cos\left(\frac{2\pi}{9}\right)}\right)^3$

A. $-\dfrac{1}{2}(\sqrt{3}-i)$

B. $-\dfrac{1}{2}(1-i\sqrt{3})$

C. $\dfrac{1}{2}(1-i\sqrt{3})$

D. $\dfrac{1}{2}(\sqrt{3}-i)$

Answer: A

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2. Let $y = y(x)$ be the solution of differential equation ,

$\frac{2+\sin x}{y+1} \cdot \frac{dy}{dx} = -\cos x, y > 0, y(0) = 1$. If

$y(\pi) = a$ and $\frac{dy}{dx}$ at $x = \pi$ is b , then the ordered pair (a, b) is equal to :

A. $(2, 1)$

B. $(1, -1)$

C. $(1, 1)$

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

Answer:

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3. The plane passing through the points $(1, 2, 1)$, $(2, 1, 2)$ and parallel to the $2x = 3y$, $z = 1$ also passes through the point :

A. $(-2, 0, 1)$

B. $(0, 6, -2)$

C. $(0, -6, 2)$

D. $(2, 0, -1)$

Answer:

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4. Let S be the set of all $\lambda \in R$ for which the system of linear equations

$2x - y + 2z = 2$

$x - 2y + \lambda x = -4$

$x + \lambda y + z = 4$

has no solution . Then the set S

A. contains more than two elements

B. is a singleton

C. contains exactly two element

D. is an empty set

Answer: C

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5. The domain of the function $f(x) = \sin^{-1}\left(\frac{|x|+5}{x^2+1}\right)$ is $(-\infty, -a] \cup [a, \infty)$. then a is equal to :

A. $\frac{\sqrt{17}}{2}+1$

B. $\frac{\sqrt{17}}{2}$

C. $\frac{1+\sqrt{17}}{2}$

D. $\frac{\sqrt{17}-1}{2}$

Answer:

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6. Let A be a 2×2 real matrix with entries from $\{0, 1\}$ and $|A| \neq 0.$

Consider the following two statements :

(P) If A $\neq I_2$ then |A| =-1

(Q) if |A| =1 , then Tr (A)=2

Where I_2 denotes 2×2 identity matrix and tr (A) denotes the sum of the diagonal entries of A then :

A. both (P) and (Q) are false

B. (P) is true and (Q) is false

C. Both (P) and (Q) are true

D. (P) is false and (Q) is true

Answer:

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7. If P (x) be a polynomial of degree three that has a local maximum value 8 at x=1 and a local minimum value 4 at x=2 , then p (0) is equal to :

A. 12

B. 6

C. -24

D. -12

Answer:

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8. IF the tangent to the curve $y = x + \sin y$ at a point (a, b) is parallel to the line joining $\left(0, \frac{3}{2}\right)$ and $\left(\frac{1}{2}, 2\right)$ then

A. $|a + b| = 1$

B. $|b - a| = 1$

C. $b = \frac{\pi}{2} + a$

D. $b = a$

Answer:

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9. The contrapostive of the statement " if I reach the station in time then I will catch the train is :

A. IF I do not reach the station in time then I will catch the train .

B. IF I do not reach the station in time then I will not catch the train .

C. If I will not catch the train , then I do not reach the station in time

D. If I will catch the train then I reach the station in time .

Answer:

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10. Let p (h,k) be a point on the curce $y = x^2 + 7x + 2$, nearest to the line $y = 3x - 3.$ then the equation of the normal to the curve at P is :

A. $x - 3y - 11 = 0$

B. $x+3y-62=0$

C. $x-3y+22=0$

D. $x+3y+26=0$

Answer:

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11. If $R=\{(x, y): x, y, \in Z, x^2+3y^2 \leq 8\}$ is a relation on the set of integers Z, then the domain R^{-1} is :

A. $\{-1, 0, 1\}$

B. $\{0, 1\}$

C. $\{-2, -1, 0, 1, 2\}$

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

Answer:

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12. Box I contains 30 cards numbered 1 to 30 and box II contains 20 cards numbered 31 to 50 A box is selected at random and a card is drawn from to be a non - prime number the probabilty that the card was drawn from Box I is :

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

B. $\frac{4}{17}$

C. $\frac{8}{17}$

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

Answer:

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13. Let $X = \{x \in N : 1 \leq x \leq 17\}$ and $Y = \{ax + b : x \in X \text{ and } a, b, \in R, a > 0\}$. If $mean$ and $variance$ of elements of Y are 17 and 216 respectively then $a + b$ is equal to

A. 9

B. 7

C. -7

D. -27

Answer:

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14. Let α and β be the roots of the equation $5x^2+6x-2=0$. if $S_n=\alpha^n+\beta^n, n=1, 2, 3...$ then :

A. $5S_6-6S_5=2S_4$

B. $6S_6+5S_5=2S_4$

C. $5S_6+6S_5=2S_4$

D. $6S_6+5S_5+2S_4=0$

Answer: C

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15. The sum of the first three terms of a G.P is S and their product is 27 .

Then all such S lie in :

A. $(-\infty, 9]$

B. $[-3, \infty)$

C. $(-\infty, -9] \cup [, \infty)$

D. $(-\infty, -3] \cup [9, \infty)$

Answer: D

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16. If $|x| < 1 and |y| < 1,$ find the sum of infinity of the following series:

$(x+y)+(x^2+xy+y^2)+(x+y)+(x^3+x^2y+xy^2+y^3)+$

A. $\dfrac{x+y+xy}{(1+x)(1+y)}$

B. $\frac{x+Y-xy}{(1-x)(1-y)}$

C. $\frac{x+y-xy}{(1+x)(1+Y)}$

D. $\frac{x+Y-xy}{(1+x)(1+y)}$

Answer:

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17. Area (in , sq units) of the region outside $\frac{|x|}{2}+\frac{|y|}{3}=1$ and inside the ellipse $\frac{x^2}{4}+\frac{y^2}{9}=1$ is :

A. $6(\pi-2)$

B. $6(4-\pi)$

C. $3(\pi-2)$

D. $3(\pi-2)$

Answer: C::D

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18. Let $\alpha > \beta > 0$ be such that $\alpha^3 + \beta^2 = 4$. if the maximum value of the term independent x in the binomial expansion of $\left(ax^{\frac{1}{9}} + \beta x^{-\frac{1}{6}}\right)^{10}$ is 10 K , then k is equal to

A. 352

B. 336

C. 84

D. 176

Answer:

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19. A line parallel to the straight line $2x - y = 0$ is tangent to the hypernola $\frac{x^2}{4} - \frac{y^2}{2} = 1$ at the point (x_1, y_1) Then $x_1^2 + 5y_1^2$ is equal to :

A. 10

B. 8

C. 5

D. 6

Answer:

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20. If a function f(x) defined by

$$f(x)=\begin{cases} ae^X+be^{-x} & -1\leq x<1 \\ cx^2 & 1\leq x\leq 3 \\ ax^2+2cx & 3<x\leq 4 \end{cases}$$

be continuous for some a,b,c $\in$ R and $f'(0)+F'(2)=e$ then the value of a is :

A. $\dfrac{e}{e^2-3e-13}$

B. $\dfrac{e}{e^2-3e+13}$

C. $\dfrac{1}{e^2-3e+13}$

D. $\dfrac{e}{e^2+3e+13}$

Answer:

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21. If the letters of the word 'MOTHER' be permuted and all the words so formed (with or without meaning) be listed as in a dictionary, then the position of the word 'MOTHER' is

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22. The integral $\int_0^2 ||x-1|-x|dx$ is equal to

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23. The number of intergral values of k for which the line, $3x+4y=k$ intersects the circle, $x^2+y^2-2x-4y+4=0$ at two district points is

______

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24. Let $\vec{a}, \vec{b}$ and $\vec{c}$ be three unit vectors such that $\left|\vec{a}-\vec{b}\right|^2+\left|\vec{a}-\vec{c}\right|^2=8$. Then $\left|\vec{a}+2\vec{b}\right|^2+\left|\vec{a}+2\vec{c}\right|^2$ is equal to _______.

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25. If $\lim_{x\to 1}\frac{x^1+x^2+x^3+\ldots+x^n-n}{x-1}=820, (n\in N)$ then the value of n is equal to

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26. Let R_1 and R_2 be two relation defined as follows : $R_1=\{(a,b)\in R^2, a^2+b^2\in Q\}$ and $R_2=\{(a,b)\in R^2, a^2+b^2\notin Q)$ where Q is the set of the rational numbers. Then:

A. R_1 and R_2 are both transitivite

B. R_2 is transitivite but R_1 is not transitive .

C. Neither R_1 and R_2 is transitive.

D. R_1 is transitivie but R_2 is not transitive .

Answer:

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27. Suppose f(x) is a polynomial of degree four , having critical points at -1,0,1. If $T = (x \in R \mid f(x) = f(0)\}$, then the sum of sqaure of the elements of T is .

A. 2

B. 6

C. 8

D. 4

Answer:

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28. Let the latus ractum of the parabola $y^2 = 4x$ be the comon chord to the circles C_1 and C_2 each of them having radius $2\sqrt{5}$. Then , the distance the centre of the circles C_1 and C_2 is :

A. 12

B. 8

C. $4\sqrt{5}$

D. $8\sqrt{5}$

Answer:

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29. $\lim_{x \to a} \dfrac{(a+2x)^{\frac{1}{3}} - (3x)^{\frac{1}{3}}}{(3a+x)^{\frac{1}{3}} - (4x)^{\frac{1}{3}}} (a \neq 0)$ is equal to :

A. $\left(\frac{2}{9}\right)^{\frac{1}{3}}$

B. $\left(\frac{2}{9}\right)\left(\frac{2}{3}\right)^{\frac{1}{3}}$

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

D. $\left(\frac{2}{3}\right)\left(\frac{2}{9}\right)^{\frac{1}{3}}$

Answer: d

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30. If $x^3dy + xydx = x^2dy + 2ydx, y(2) = e$ and $x > 1,$ then y(4) is equal to .

A. $\frac{1}{2} + \sqrt{e}$

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

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

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

Answer:

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31. The probabilty that a randomly chosen 5 - digit number is made form exactly two digits :

A. $\dfrac{150}{10^4}$

B. $\dfrac{135}{10^4}$

C. $\dfrac{121}{10^4}$

D. $\dfrac{134}{10^4}$

Answer:

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32. Let a,b, c $\in R$ be such that $a^2+b^2+c^2$ = 1 . If $a\cos\theta = b\cos\left(\theta+\dfrac{2\pi}{3}\right) = c\cos\left(\theta+\dfrac{4\pi}{3}\right)$, where $\theta = \dfrac{\pi}{9}$, then the angle between the vectors $a\hat{i}+b\hat{j}+c\hat{k}$ and $b\hat{i}+c\hat{j}+a\hat{k}$ is

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

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

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

D. 0

Answer:

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33. Let p,q r be three statements such that the truth value of $(p \wedge q) \rightarrow (q \vee r)$ is F. Then the truth value of p,q r are respectively :

A. T, T,F

B. T,F,T

C. F,T,F

D. none of the above

Answer:

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34. The set of all real values of λ for which the quadratic equations , $(\lambda^2+1)x^2-4\lambda x+2=0$ always have exactly one root in the interval (0,1) is :

A. (0,2)

B. (-3,-1)

C. (1,3)

D. (2,4]

Answer:

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35. Let A be a 3×3 matrix such that adj $A=\begin{bmatrix}2 & -1 & 1\\ -1 & 0 & 2\\ 1 & -2 & -1\end{bmatrix}$ and B =adj (adj A) .

If $|A| = \lambda$ and $\left|\left(B^{-1}\right)^{T}\right| = \mu$ then the ordered pair $(|\lambda|, \mu)$ is equal to

A. $\left(9, \frac{1}{9}\right)$

B. $\left(3, \frac{1}{81}\right)$

C. $(3, 81)$

D. $\left(9, \frac{1}{81}\right)$

Answer:

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36. If the value of the integral $\int_0^{1/2} \frac{x^2}{\left(1 - x^2\right)^{3/2}}$ dx is $\frac{k}{6}$ then k is equal to :

A. $2\sqrt{3} - \pi$

B. $2\sqrt{3} + \pi$

C. $3\sqrt{2} + \pi$

D. $3\sqrt{2} - \pi$

Answer: A

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37. Let e_1 and e_2 be the ecentricities of the ellispe $\frac{x^2}{25}+\frac{y^2}{b^2}=1(b<5)$ and the hyperbola , $\frac{x^2}{16}-\frac{y^2}{b^2}$ = 1 respecitvely staifying e_1e_2= 1. If α and β are the distance between the foci of the ellispse and the foci of the hyperbola resectively , then the ordered pair (α, β) is equal to :

A. $\left(\frac{20}{3}, 12\right)$

B. $(8, 10)$

C. $\left(\frac{24}{5}, 10\right)$

D. $(8, 12)$

Answer:

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38. If the surface area of a cube is increasing at rate of $3.6 cm^2 / \sec$, then the rate of change of its volume (in $cm^3 / \sec$) . When the length of a side of the cube is 10 cm , is

A. 18

B. 10

C. 20

D. 9

Answer:

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39. If z_1, z_2 are complex number such that $Re(z_1) = |z_1 - 1|, Re(z_2) = |z_2 - 1|$ and $arg(z_1 - z_2) = \frac{\pi}{3}$, then $Im(z_1 + z_2)$ is equal to

A. $2\sqrt{3}$

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

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

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

Answer:

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40. If a ΔABC has vertices $A(-1, 7), B(-7, 1)$ and C(5,-5) then its orthocentre has coordinates :

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

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

C. $(-3, 3)$

D. $(3, -3)$

Answer:

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41. The plane which bisects the line joining the points (4, -2, 3) and (2,4,-1) at right angles also passes through the point :

A. $(0, \ -1, 1)$

B. $(0, 1, \ -1)$

C. $(4, 0, 1)$

D. $(4, 0, \ -1)$

Answer:

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42. Let $x_i(1 \leq I \leq 10)$ be ten observation of a random variable X. If $\sum_{i=l}^{10}(x_i - p) = 3$ and $\sum_{i=l}^{10}(x_i - p)^2 = 9$ where $0 \neq p \in R$,then the standard deviation of these observations is :

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

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

C. $\frac{7}{10}$

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

Answer:

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43. If the terms independent of x in the expansion of $\left(\frac{3}{2}x^2 - \frac{1}{3x}\right)^9$ is k, then 18 k is equla to

A. 5

B. 11

C. 9

D. 7

Answer:

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44. If the sum of the series $20 + 19\frac{3}{5} + 19\frac{1}{5} + 18\frac{4}{5} + \ldots..$ upto nth tems is 488 and the nth terms is negative then :

A. nth term is -4

B. nth terms $-4\frac{2}{5}$

C. n = 60

D. n = 41

Answer: A

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45. If $\int \sin^{-1}\left(\sqrt{\frac{x}{1+x}}\right)dx = A(x)\tan^{-1}(\sqrt{x}) + B(x) + C$, where C is a constant of integration then the ordered pair (A(x) , B(x)) can be :

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

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

C. $\left(x-1, -\sqrt{x}\right)$

D. $\left(x+1, -\sqrt{x}\right)$

Answer:

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46. Let S be the set of all integer solutions, (x,y,z) of the system of equation

$x-2y+5z=0$

$-2x+4y+z=0$

$-7x+14y+9z=0$

such that $15 \leq x^2+y^2+z^2 \leq 150$. Then, the number of elements of the set S is equal to _______

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47. Let a place P contain two lines

$\overrightarrow{r} = \hat{i} + \lambda\left(\hat{i} + \hat{j}\right), \lambda \in R$ and

$\overrightarrow{r} = -\hat{j} + \mu\left(\hat{j} - \hat{k}\right), \mu \in R$.

If $Q(\alpha, \beta, \gamma)$ is the food of the perpendicular drawn from the point M(1,0,1) to P, then $3(\alpha + \beta + \gamma)$ equals ____________.

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48. m A.M. and 3 G.M. are inserted between 3 and 243 such that 2^{nd} GM= 4^{th} AM then $m =$

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49. If the tangent to the curve $y = e^x$ at a point (c, e^c) and the normal to the parabola, $y^2 = 4x$ at the point (1,2) intersect at the same point on the x-axis then the value of c is ____________.

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50. The total number of 3-digit numbers, whose sum of digits is 10, is ________.

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51. If $\left(a+\sqrt{2}b\cos x\right)\left(a-\sqrt{2}b\cos y\right)=a^2-b^2$, where $a>b>0$, then $\frac{dx}{dy}$ at $\left(\frac{\pi}{4}, \frac{\pi}{4}\right)$ is :

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

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

C. $\frac{2a+b}{2a-b}$

D. $\frac{a-2b}{a+2b}$

Answer: B

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52. The mean and variance of 8 observations are 10 and 13.5 respectively . If 6 of these observations are 5,7,10,12,14,15 , then the absolute difference of the remaining two observations is :

A. 9

B. 3

C. 7

D. 5

Answer: C

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53.

$$1+\left(1-1.2^2\right)+\left(1-3.4^2\right)+\left(1-5.6^2\right)+\ldots..\left(1-19.20^2\right)=\alpha-220\beta$$

find(α, β)

A. (11,97)

B. $(10, 103)$

C. $(10, 97)$

D. -11103

Answer:

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54. A survey shows that 63% of the people watch a news channal whereas 76% watch another channel. If $x\%$ of the people watch both channel, then

A. 55

B. 29

C. 65

D. 37

Answer: C

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55. The following statement $\left(p\overrightarrow{q}\right)\overrightarrow{\left(\text{~}p\overrightarrow{q}\right)\overrightarrow{q}}$ is: equivalent to $p\overrightarrow{\text{~}}q$ (2) a fallacy a tautology (4) equivalent to $\text{~}p\overrightarrow{q}$

A. both (S_1) and (S_2) are not correct

B. only (S_1) is correct

C. both (S_1) and (S_2) are correct

D. only (S_2) is correct

Answer: C

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56. If two vertical pale AB and CD of height 15 m and 10 m and A and C are on ground. P is the point of intersection of BC and AD. What is height of P from the ground in m.

A. $20/3$

B. 6

C. $10/3$

D. 5

Answer: D

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57. If f is twice differentiable function for $x \in R$ such that $f(2) = 5, f'(2) = 8$ and $f'(x) \geq 1, f''(x) \geq 4$, then

A. $f(5) + f'(5) \geq 28$

B. $f(5) \leq 10$

C. $f(5) + f'(5) \leq 26$

D. $f(5) + f'(5) \leq 20$

Answer: A

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58. $\sum_{r=0}^{20} .^{50-r}C_6$

A. $.^{50}C_7 - 30C_7$

B. $.^{51}C_7 - 30C_7$

C. $.^{51}C_7 + 30C_7$

D. $.^{50}C_6 - 30C_6$

Answer: D

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59. If $A = \begin{bmatrix} \cos\theta & i\sin\theta \\ i\sin\theta & \cos\theta \end{bmatrix}, \left(\theta = \frac{\pi}{24}\right)$ and $A^5 = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$, where $i = \sqrt{-1}$ then, which one of the following is not true ?

A. $a^2 - d^2 = 0$

B. $a^2 - c^2 = 1$

C. $a^2 - b^2 = \frac{1}{2}$

D. $0 \leq a^2 + b^2 \leq 1$

Answer: B

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60. If α and β are roots of $x^2 - 3x + p = 0$ and γ and δ are the roots of $x^2 - 6x + q = 0$ and $\alpha, \beta, \gamma, \delta$ are in G.P. then find the ratio of $(2p + q) : (2p - q)$

A. $9 : 7$

B. $3 : 1$

C. $5 : 3$

D. $33 : 31$

Answer: B

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61. Let $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1 (a > b)$ be a given ellipse, length of whose latus rectum is 10. If its eccentricity is the maximum value of the function, $p\phi(t) = \frac{5}{2} + t - t^2$, then $a^2 + b^2$ is equal to :

A. 145

B. 116

C. 126

D. 135

Answer:

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62. A triangle ABC laying in the first quadrant has two vertices as A(1 , 2) B(3 , 1). If , $\angle BAC = 90^\circ$ and ar $(\Delta ABC) = 5\sqrt{5}$ sq. units , then the abscissa of the vertex C is :

A. $2 + \sqrt{5}$

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

C. $2\sqrt{5}-1$

D. $1+\sqrt{5}$

Answer:

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63. If from point $P(3, 3)$ on the hyperbola a normal is drawn which cuts x-axis at $(9, 0)$ on the hyperbola $\frac{x^2}{a^2}-\frac{y^2}{b^2}=1$ the value of $\left(a^2, e^2\right)$ is

A. $\left(\frac{9}{2}, 3\right)$

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

C. $\left(\frac{9}{2}, 2\right)$

D. (9,3)

Answer: A

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64. The integral $\int \left(\frac{X}{x \sin x + \cos x} \right)^2 dx$ is equal to

(where C is a constant integration) :

A. $\sec x - \frac{x \tan x}{x \sin x + \cos x} + C$

B. $\sec x + \frac{x \tan x}{x \sin x + \cos x} + C$

C. $\tan x - \frac{x \sec x}{x \sin x + \cos x} + C$

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

Answer:

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65. Let $f(x) = \int \frac{\sqrt{x}}{(1+x)^2} dx (x \geq 0)$. The f(3) - f(1) is equal to :

A. $-\frac{\pi}{6} + \frac{1}{2} + \frac{\sqrt{3}}{4}$

B. $-\frac{\pi}{12} + \frac{1}{2} + \frac{\sqrt{3}}{4}$

C. $\frac{\pi}{6}+\frac{1}{2}-\frac{\sqrt{3}}{4}$

D. $\frac{\pi}{12}+\frac{1}{2}-\frac{\sqrt{3}}{4}$

Answer:

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66. If $u=\frac{2z+i}{z-ki}$ where $z=x+iy$ and $k>0$

Curve $Re(u)+Im(u)=$ cuts y-axis at two point P and Q such that PQ=5 then value of k is

A. $1/2$

B. 4

C. 2

D. $3/2$

Answer:

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67. Let x_0 be the point of local maxima of $f(x) = \vec{a} . \left(\vec{b} \times \vec{c}\right)$, where $\vec{a} = x\vec{i} - 2\vec{j} + 3\vec{k}$, $\vec{b} = -2\vec{i} + x\vec{j} - \vec{k}$ and $\vec{c} = 7\vec{i} - 2\vec{j} + x$. Then the value of $\vec{a} . \vec{b} + \vec{b} . \vec{c} + \vec{c} . \vec{a}$ at $x = x_0$ is :

A. 14

B. -14

C. -22

D. -30

Answer: B

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68. Let [t] denote the greatest integer st. Then the equation in x, $[x]^2 + 2[x+2] - 7 = 0$ has :

A. infinitely many solutions.

B. exactly four integral solutions.

C. no integral solution.

D. exactly two solutions .

Answer: B

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69. $xy' - y = x^2(x\cos x + \sin x)$ and if $f(\pi) = \pi$ then find $f''\left(\frac{\pi}{2}\right) + f\left(\frac{\pi}{2}\right) =$

A. $2 + \frac{\pi}{2} + \frac{\pi^2}{4}$

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

C. $1 + \frac{\pi}{2} + \frac{\pi^2}{4}$

D. $2 + \frac{\pi}{2}$

Answer:

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70. If $f(x) = |x-2|, x \in [0, 4]$ and $g(x) = f(f(x))$. Find $\int_2^3 (g(x) - f(x))dx$.

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

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

C. 0

D. 1

Answer: C

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71. If $\left(2x^2 + 3x + 4\right)^{10} = \sum_{r=0}^{20} a_r x^r$, then $\frac{a_7}{a_{13}}$ =

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72. If the equation of a plane P , passing through in the intersection of the planes, $x + 4y - z + 7 = 0$ and $3x + y + 5z = 8$ is $ax + by + 6z = 15$ for some $a, b, c \in R$, then the distance of the point (3,2,-1) form the plane P is ....

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73. If probability of hitting a target is $\frac{1}{10}$, Then number of shot required so that probability to hit target at least once is greater than $\frac{1}{4}$.

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74. Let $f: R \to R$ be a differentiable function satisfying $f(x + y) = f(x) + f(y) + x^2y + xy^2$ for all real numbers x and y. If $\lim_{x \to 0} \frac{f(x)}{x} = 1$, then

The value of f'(3) is

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75. If the system of equations

$x - 2y + 3z = 9$

$2x + y + z = b$

$x - 7y + az = 24$, has infinitely many solutions, then a - b is equal to

....

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76. The intergral $\int_1^2 e^x . X^2(2 + \log_e x)dx$ equals "

A. $e(4e + 1)$

B. $4e^2 - 1$

C. $e(4e - 1)$

D. $e(2e - 1)$

Answer:

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77. The are (insq . Units) of the region enclosed by the curves $y = x^2 - 1$ and $y = 1 - x^2$ is equal to

A. $\frac{4}{8}$

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

C. $\frac{7}{2}$

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

Answer:

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78. If the angle of elevation of the top of a summit is 45° and a person climbs at an inclination of 30° upto 1 km, where the angle of elevation of top becomes 60°, then height of the summit is

A. $\frac{\sqrt{3}-1}{\sqrt{3}+1}$

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

C. $\dfrac{1}{\sqrt{3}-1}$

D. $\dfrac{1}{\sqrt{3}+1}$

Answer:

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79. The set of all real value of λ for which the functio $f(x) = (1 - \cos^2 x).\ (\lambda + \sin x), x e\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ has exactly one maxina and exactly one minima is

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

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

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

D. $\left(-\frac{3}{2}, \frac{3}{2}\right) - \{0\}$

Answer:

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80. If α, β are the roots of equation $2x(2x+1)=1$ then $\beta =$

A. $2\alpha(\alpha+1)$

B. $-2\alpha(\alpha+1)$

C. $2\alpha(\alpha-1)$

D. $2\alpha^2$

Answer:

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81. For all twice differentiable functions $f: R \to R$, with $f(0)=f(1)=f'(0)=0$

A. $f(x) \neq 0$ at every point $x \in (0,1)$

B. $f'(x)=0$ for some $x \neq (0,1)$

C. $f'(0)=0$

D. $f''(x) = 0$, at every point $x \in (0, 1)$

Answer:

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82. If $y = \left(\frac{2}{\pi}x - 1\right)$ cosec x the solution of the differential equation, $\frac{dy}{dx} + p(x)y = \frac{2}{\pi}\cos ecx, 0 < x < \frac{\pi}{2}$, then the function $p(x)$ is equal to

A. cot x

B. cosec x

C. sec x

D. tan x

Answer:

Watch Video Solution

83. Let L denote the line in the x - y plane with x and y intercepts as 3 and 1 respectively . The the image of the point (-1,-4) in this line is :

A. $\left(\frac{11}{5}, \frac{28}{5}\right)$

B. $\left(\frac{29}{5}, \frac{8}{5}\right)$

C. $\left(\frac{8}{5}, \frac{29}{5}\right)$

D. $\left(\frac{29}{5}, \frac{11}{5}\right)$

Answer:

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84. If the tangent to the curve , y =f (x)= $x \log_e x, (x > 0)$ at a point (c, f(c)) is parallel to the line - segment joining the point (1,0) and (e,e) then c is equal to :

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

B. $e^{\left(\frac{1}{e-1}\right)}$

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

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

Answer:

Watch Video Solution

85. Let $f, R \rightarrow R$ be a function defined by f(x) = max $\left\{x, x^2\right\}$. Let S denote the set of all point in R , where f is not differnetiable Then :

A. $\{0, 1\}$

B. $\{0\}$

C. ϕ(an empty set)

D. $\{1\}$

Answer:

Watch Video Solution

86. Let $\theta = \frac{\pi}{5}$ and $A = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$. If B = A $+ A^4$, then det (B).

A. is one

B. lies in (2,3)

C. is zero

D. lies in (1,2)

Answer:

Watch Video Solution

87. A plane P meets the coordinate axes at A B and C respectively . The centroid of ΔABC is give to be (1,1,2) . Then the equation of the line through this centroid and perpendicular to the plane P is ,

A. $\frac{x-1}{2} = \frac{y-1}{1} = \frac{z-2}{1}$

B. $\frac{x-1}{1} = \frac{y-1}{1} = \frac{z-2}{2}$

C. $\frac{x-1}{2} = \frac{y-1}{2} = \frac{z-2}{1}$

D. $\frac{x-1}{1}=\frac{y-1}{2}=\frac{z-2}{2}$

Answer:

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88. The common difference of the AP $b_1, b_2. \ldots.., b_m$ is 2 more than the common differece of A.P $a_1, a_2, \ldots\ldots.., a_n$. If $a_{40} = -159$, $a_{100} = -399$ and $b_{100} = a_{70}$, then b_1 is equal to :

A. 81

B. -127

C. -81

D. 127

Answer:

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89. If the normal at an end of a latus rectaum of an ellipse passes through an extremity of the minor axis then the eccentricity of the ellipse satisfies

.

A. $e^4 + 2e^2 - 1 = 0$

B. $e^2 + e - 1 = 0$

C. $e^4 + e^2 - 1 = 0$

D. $e^2 + 2e - 1 = 0$

Answer:

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90. For a suitabily chosen real constanat a let a fuction , $f: R\text{~}[\text{~}a] \rightarrow R$ be defined by $f(x) = \dfrac{a-x}{a+x}$. Further suppose that for any real number $x \ne -a$ and $f(x) \ne = 2$ (fof) (x) = x . Then $f\left(-\dfrac{1}{2}\right)$ is equal to :

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

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

C. -3

D. 3

Answer:

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91. If the constant term in the binomial expansion of $\left(\sqrt{x} - \frac{k}{x^2}\right)^{10}$ is 405 , then |k| equals :

A. 9

B. 1

C. 3

D. 2

Answer:

Watch Video Solution

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

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

B. $\left(\frac{6}{5}, \frac{53}{10}\right)$

C. $\left(\frac{3}{10}, \frac{16}{5}\right)$

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

Answer:

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93. Let z = x + iy be a non - zero complex number such that $z^2 = I|z|^2$, where $I = \sqrt{-1}$ then z lies on the :

A. line y =- x

B. imaginary axis

C. line , y = x

D. real axis

Answer:

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94. Consider the statement : For an interger n if $n^3 - 1$ is even, the n is odd " . The contrapositive statemnet of this statement is :

A. For an interger n , if n is even then $n^3 - 1$ is odd.

B. For an integer n , if $n^3 - 1$ is not even then n is not odd .

C. For an interger n if n is even then $n^3 - 1$ is even .

D. For an integer n if n is odd then $n^3 - 1$ is even .

Answer:

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95. The probabilites fo three events A, B and C are given by P(A) = 0.6, P(B) = 0.4 and P(C) = 0.5 . If $P(A \cup B) = 0.8, P(A \cap C) = 0.3 P(A \cap B \cap C) = 0.2, P(B \cap C) = \beta$ and $P(A \cup B \cup C) = \alpha$ where $0.85 \leq \alpha \leq 0.95$, then β lines in the interval :

A. $[0.35, 0.36]$

B. $[0.25, 0.35]$

C. $[0.20, 0.25]$

D. $[0.36, 0.40]$

Answer:

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96. Suppose that a function $f: R \rightarrow R$ satisfies $f(x+y) = f(x)f(y)$ for all x $y \in R$ and $f(1) = 3$. If $\sum_{i=l}^{n} f(i) = 363$, then n is equa to ______ .

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97. The sum of distinct value of λ for which the system of equations

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

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

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

has non - zeor solutions is _____.

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98. If $\overrightarrow{x}$ and $\overrightarrow{y}$ be two non - zero vectors such that $\left|\overrightarrow{x}+\overrightarrow{y}\right|=\left|\overrightarrow{x}\right|$ and $2\overrightarrow{x}+\lambda\overrightarrow{y}$ is perpendicular to $\overrightarrow{y}$ then the value of λ is _____ .

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99. Consider the date on x taking the values $0, 2, 4, 8, \ldots\ldots\ldots, 2^n$ with frequencies ${}^nC_0, {}^nC_1, {}^nC_2, \ldots\ldots\ldots, {}^nC_n$ respectively . If the mean of this data is $\frac{728}{2^n}$ then n is equal to ______.

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100. The number of word (with or without meaning) that can be formed from all the letter of the word " LETTER " in which vowels never come together is _____ .

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101. $\int_{\frac{\pi}{6}}^{\frac{\pi}{3}} \tan^3 x \sin^2 3x \left(2 \sec^2 x \sin^2 3x + 3 \tan x . \sin 6x\right) dx$

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

B. $-\frac{1}{18}$

C. $\frac{7}{18}$

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

Answer:

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102. Let $\bigcup_{i=1}^{50} X_i = \bigcup_{i=1}^{n} Y_i = T$, where each X_i contains 10 elements and each Y_i contains 5 elements. If each element of the set T is an element of exactly 20 of sets $X'_i s$ and exactly 6 of sets $Y'_i s$, then n is equal to:

A. 30

B. 15

C. 50

D. 45

Answer:

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103. If α, β are roots of $x^2 - x + 2\lambda = 0$ and α, γ are roots of $3x^2 - 10x + 27\lambda = 0$ then value of $\frac{\beta\gamma}{\lambda}$ is

A. 18

B. 9

C. 27

D. 36

Answer:

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104. Contrapositive of the statement :

'If a function f is differentiable at a, then it is also continuous at a', is :

A. If a function f is not continuous at a, then it is differentiable at a.

B. If a function f is not continuous at a, then it is not differentiable at a.

C. If a function f is continuous at a, then it is differentiable at a.

D. If a function f is continuous at a, then it is not differentiable at a.

Answer:

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105. If the system of equations

$x+y+z=2$

$2x+4y-z=6$

$3x+2y+\lambda z=\mu$

has infinitely many solutions, then :

A. $2\lambda+\mu=-14$

B. $\lambda+2\mu=14$

C. $\lambda-\mu=5$

D. $\lambda-2\mu=-5$

Answer: A

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106. Suppose the vectors x_1, x_2 and x_3 are the solutions of the system of linear equations, $Ax=b$ when the vector b on the right side is equal to b_1, b_2 and b_3 respectively. If

$$x_1 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}, x_2 = \begin{bmatrix} 0 \\ 2 \\ 1 \end{bmatrix}, x_3 = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}, b_1 = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}, b_2 = \begin{bmatrix} 0 \\ 2 \\ 0 \end{bmatrix} \text{ and } b_3 = \begin{bmatrix} 0 \\ 0 \\ 2 \end{bmatrix}$$

, then the determinant of A is equal to :

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

B. 4

C. 2

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

Answer: C

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107. Two persons A and B play a game of throwing a pair of dice until one of them wins. A will win if sum of numbers on dice appear to be 6 and B will win. If sum is 7. What is the probability that A wins the game if A starts the game.

A. $\frac{5}{31}$

B. $\frac{5}{6}$

C. $\frac{31}{61}$

D. $\frac{30}{71}$

Answer:

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108. The area (in sq. units) of the largest rectangle ABCD whose vertices A and B lie on the x - axis and vertices C and D lie on the parabola, $y = x^2 - 1$ below the x - axis, is :

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

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

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

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

Answer:

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109. The angle of elevation of a cloud C from a point P, 200 m above a still lake is 30°. If the angle of depression of the image of C in the lake from the point P is 60°, then PC (in m) is equal to :

A. $200\sqrt{3}$

B. 400

C. $400\sqrt{3}$

D. 100

Answer:

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110. Let $f:(0, \infty) \rightarrow (0, \infty)$ be a differentiable function such that $f(1) = e$ and $\lim_{t \rightarrow x} \frac{t^2 f^2(x) - x^2 f^2(t)}{t - x} = 0$. If $f(x) = 1$, then x is equal to :

A. 2e

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

C. e

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

Answer:

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111. Let $a_1, a_2, \ldots\ldots, a_n$ be a given A.P. whose common difference is an integer and $S_n = a_1 + a_2 + \ldots\ldots\ldots\ldots + a_n$. If $a_1 = 1, a_n = 300$ and $15 \leq n \leq 50$, then the ordered pair $(S_{n-4}{'}a_{n-4})$ is equal to:

A. (2490, 248)

B. (2480, 248)

C. (2480, 249)

D. (2490, 249)

Answer:

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112. If for some positive integer n, the coefficients of three consecutive terms in the binomial expansion $(1+x)^{n+5}$ are in the ratio $5:10:14$, then the largest coefficient in this expansion is :

A. 252

B. 462

C. 792

D. 330

Answer:

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113. If a and b are real numbers such that $(2+\alpha)^4 = a + b\alpha$, where $\alpha = \frac{-1+i\sqrt{3}}{2}$, then $a+b$ is equal to:

A. 24

B. 33

C. 57

D. 9

Answer:

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114. The solution of the differential equation $\frac{dy}{dx} - \frac{y+3x}{\log_e(y+3x)} + 3 = 0$ is :

(where C is a constant of integration)

A. $x - \log_e(y + 3x) = C$

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

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

D. $x - 2\log_e(y + 3x) = C$

Answer:

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115. The function $f(x) = \begin{cases} \frac{\pi}{4} + \tan^{-1} x, & |x| \le 1 \\ \frac{1}{2}(|x| - 1), & |x| > 1 \end{cases}$ is :

A. continuous on $R - \{-1\}$ and differentiable on $R - \{-1, 1\}$.

B. both continuous and differentiable on $R - \{-1\}$

C. continuous on $R - \{1\}$ and differentiable on $R - \{-1, 1\}$.

D. both continuous and differentiable on $R - \{1\}$.

Answer:

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116. Center of a circle S passing through the intersection points of circles $x^2 + y^2 - 6x = 0 \& x^2 + y^2 - 4y = 0$ lies on the line $2x - 3y + 12 = 0$ then circle S passes through

A. $(1, -3)$

B. $(-1, 3)$

C. $(-3, 6)$

D. $(-3, 1)$

Answer:

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117. Let $x = 4$ be a directrix to an ellipse whose centre is at the origin and its eccentricity is $\frac{1}{2}$. If $P(1, \beta), \beta > 0$ is a point on this ellipse, then the equation of the normal to it at P is :

A. $7x - 4y = 1$

B. $4x - 2y = 1$

C. $8x - 2y = 5$

D. $4x - 3y = 2$

Answer: B

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118. The distance of the point $(1, -2, 3)$ from the plane $x - y + z = 5$ measured parallel to the line $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$, is

A. 1

B. $\frac{7}{5}$

C. 7

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

Answer:

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119. The minimum value of $2^{\sin x} + 2^{\cos x}$ is -

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

B. $2^{-1+\sqrt{2}}$

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

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

Answer:

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120. Find the equation of the perpendicular bisector of the line segment joining the points (1,1) and (2,3).

A. -2

B. -4

C.

D.

Answer:

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121. The sum of the series $(2.^{1}P_0 - 3.^{2}P_1 + 4^{3}P_2 - 5.^{4}P_3 + \ldots .51$ terms) +$(1! - 2! + 3! - \ldots + 51$ terms)=

A. $1 - 51(51)!$

B. $1 + (52)!$

C. 1

D. $1 + (51)!$

Answer: B

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122. Let P be a point on the parabola, $y^2 = 12x$ and N be the foot of the perpendicular drawn from P on the axis of the parabola. A line is now drawn through the mid-point M of PN,parallel to its axis which meets the parabola at Q. If the y-intercept of the line NQ is $\frac{4}{3}$, then

A. $PN = 4$

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

C. $PN = 3$

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

Answer: D

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123. Matrix was given as det $\begin{bmatrix} x-2 & 2x-3 & 3x-4 \\ 2x-3 & 3x-4 & 4x-5 \\ 3x-5 & 5x-8 & 10x-17 \end{bmatrix} = Ax^3 + Bx^2 + Cx + D$. Find the value of $B + C$.

A. 1

B. 1

C. -3

D. 9

Answer: C

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124. The foot of the perpendicular drawn form the point $(4, 2, 3)$ to the line joining the points $(1, -2, 3)$ and $(1, 1, 0)$ lies on the plane:

A. $x - y - 2z = 1$

B. $x - 2y + z = 1$

C. $2x + y - z = 1$

D. $x + 2y - z = 1$

Answer: C

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125. If $y^2 + \log_e(\cos^2 x) = yx \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$, then

A. $|y'(0)| + |y''(0)| = 1$

B. $y''(0) = 0$

C. $|y''(0)| + |y''(0)| = 3$

D. $|y''(0)| = 2$

Answer: D

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126. Solve : $2\pi - \left(\sin^{-1}\left(\frac{4}{5}\right) + \sin^{-1}\left(\frac{5}{13}\right) + \sin^{-1}\left(\frac{16}{65}\right)\right) =$

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

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

C. $\frac{7\pi}{4}$

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

Answer: B

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127. The length of transverse axis of a hyperbola is $\sqrt{2}$. The foci of hyperbola are same as the foci of ellipse $3x^2 + 4y^2 = 12$. Which of the following points does not lie on the hyperbola?

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

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

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

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

Answer: A

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128. For the frequency distribution:

Variate (x):	x_1	x_2	$x_3 \ldots . x_{15}$
Frequency (f):	f_1	f_2	$f_3 \ldots . f_{15}$

where $0 < x_1 < x_2 < x_3 < \ldots . < x_{15} = 10$ and $\sum_{i=1}^{15} f_i > 0$, the standard deviation cannot be :

A. 1

B. 4

C. 6

D. 2

Answer: C

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129. A die is thrown two times and the sum of the scores appearing on the die is observed to be a multiple of 4. Then the conditional probability that the score 4 has appeared atleast once is:

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

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

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

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

Answer: D

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130. The number of integral terms in the expansion of $\left(\sqrt{3}+\sqrt[5]{8}\right)^{256}$ is

A. 128

B. 248

C. 256

D. 264

Answer: C

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131. $\int_{-\pi}^{\pi} |\pi - |x| \, | \, dx$

A. π^2

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

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

D. $2\pi^2$

Answer: A

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132. If A={m: both roots of $x^2 - (m+1)x + m + 4 = 0$ is real} and B= $[-3, 5)$ which of the following is wrong?

A. $A - B = (-\infty, -3) \cup (5, \infty)$

B. $A \cap B = \{-3\}$

C. $B - A = (-3, 5)$

D. $A \cup B = R$

Answer: A

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133. The proposition $p \rightarrow \sim(p \wedge \sim q)$ is equivalent to :

A. $(\sim p) \vee (\sim q)$

B. $(\sim p) \wedge q$

C. q

D. $(\sim p) \vee q$

Answer: D

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134. The function, $f(x) = (3x - 7)x^{2/3}$, x in is increasing for all x lying in

:

A. $\left(-\infty, -\frac{14}{15}\right) \cup (0, \infty)$

B. $\left(-\infty, \frac{14}{15}\right)$

C. $(-\infty, 0) \cup \left(\frac{14}{15}, \infty\right)$

D. $(-\infty, 0) \cup \left(\frac{3}{7}, \infty\right)$

Answer: C

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135. If the first term of an A.P. is 3 and the sum of its first 25 terms is equal to the sum of its next 15 terms, then the common difference of this A.P. is:

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

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

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

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

Answer: A

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136. The solution curve of the differential equation, $(1+e^{-x})(1+y^2)\frac{dy}{dx}=y^2$, which passes through the point (0,1), is:

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

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

C. $y^2+1=y\left(\log_e\left(\frac{1+e^{x}}{2}\right)+2\right)$

D. $y^2=1+y\left(\log_e\left(\frac{1+e^{x}}{2}\right)\right)$

Answer: D

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137. The area (in sq. units) of the region $\left\{(x, y): 0 \leq y \leq x^2+1, 0 \leq y \leq x+1, \frac{1}{2} \leq x \leq 2\right\}$ is

A. $\frac{23}{16}$

B. $\frac{79}{16}$

C. $\frac{23}{6}$

D. $\frac{79}{24}$

Answer: D

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138. If α and β are roots of the equation $x^2+px+2=0$ and $\frac{1}{\alpha}$ and $\frac{1}{\beta}$ are the roots of the equation $2x^2+2qx+1=0$, then $\left(\alpha-\frac{1}{\alpha}\right)\left(\beta-\frac{1}{\beta}\right)\left(\alpha+\frac{1}{\beta}\right)\left(\beta+\frac{1}{\alpha}\right)$ is equal to :

A. $\frac{9}{4}(9+p^2)$

B. $\frac{9}{4}(9+q^2)$

C. $\frac{9}{4}(9-p^2)$

D. $\frac{9}{4}(9-q^2)$

Answer: C

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139. Determine whether the following pair of lines intersect: $\vec{r}=\hat{i}-\hat{j}+\lambda\left(2\hat{i}+\hat{k}\right)$ and $\vec{r}=2\hat{i}-\hat{j}+\mu\left(\hat{i}+\hat{j}-\hat{k}\right)$

A. do not intersect for any values of l and m

B. intersect when l=1 and m=2

C. intersect when l=2 and $m=\frac{1}{2}$

D. intersect for all values of l and m

Answer: A

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140. If $\lim_{x \to 0} \frac{|1 - x + |x||}{|\lambda - x + [x]|} = L$ find L, where $\lambda \in R - \{0, 1\}$ and [.] denotes G.I.F.

A. 0

B. 2

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

D. 1

Answer: B

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141. If $\lim_{x \to 0} \left(\frac{1 - \cos\left(\frac{x^2}{2}\right) - \cos\left(\frac{x^2}{4}\right) + \cos\left(\frac{x^2}{2}\right)\cos\left(\frac{x^2}{4}\right)}{x^8} \right) = 2^{-k}$.

Find k.

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142. The diameter of the circle, whose centre lies on the line $x + y = 2$ in the first quadrant and which touches both the lines $x = 3$ and $y = 2$, is ....

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143. The value of $(0.16)^{\log_{2.5}\left(\frac{1}{3}+\frac{1}{3^2}+\frac{1}{3^3}+\dots\text{to}\infty\right)}$, is

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144. In the matrix $A = \begin{bmatrix} x & 1 \\ 1 & 0 \end{bmatrix}$ and $A^4 = \begin{bmatrix} 109 & a_{12} \\ a_{21} & a_{22} \end{bmatrix}$, then find the value of a_{22} is equal to

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145. If $\left(\frac{1+i}{1-i}\right)^{\frac{m}{2}} = \left(\frac{1+i}{1-i}\right)^{\frac{n}{3}} = 1, (m, n \in N)$ then the greatest common divisor of the least values of m and n is ....

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146. If y = y (x) is the solution of the differential equation $\frac{5+e^{x}}{2+y}\cdot\frac{dy}{dx}+e^{x}=0$ satisfying y(0) = 1 , then a value of $y(\log_{e}13)$ is :

A. 1

B. -1

C. 0

D. 2

Answer:

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147. Find the product of the roots of the equation $9x^{2}-18|x|+5=0$

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

B. $\frac{25}{81}$

C. $\frac{5}{27}$

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

Answer:

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148. The negation of the Boolean expression $x \leftrightarrow \sim y$ is equivalent to :

A. $(x \wedge y) \vee (\sim x \wedge \sim y)$

B. $(x \wedge y) \wedge (\sim x \vee \sim y)$

C. $(x \wedge \sim y) \vee (\sim x \wedge y)$

D. $(\sim x \wedge y) \vee (\sim x \wedge \sim y)$

Answer:

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149. The mean and variance of 7 observations are 8 and 16 , respectively . If five observations are 2 , 4 , 10 , 12 , 14 , then the absolute difference of the remaining two observations is :

A. 1

B. 4

C. 2

D. 3

Answer:

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150. If

$2^{10}+2^{9}\cdot 3^{1}+2^{8}\cdot 3^{2}+\ldots .+2\cdot 3^{9}+3^{10}=S-2^{11}$, then S is equal to :

A. $3^{11}-2^{12}$

B. 3^{11}

C. $\frac{3^{11}}{2} + 2^{10}$

D. $2 \cdot 3^{11}$

Answer:

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151. The numbers $3^{2\sin 2\alpha - 1}$, 14 and $3^{4 - 2\sin 2\alpha}$ form first three terms of A.P., its fifth term is

A. 66

B. 81

C. 65

D. 78

Answer:

Watch Video Solution

152. If the volume of a parallelopiped ,whose coterminus edges are given by the vectors $\vec{a} = \hat{i} + \hat{j} + n\hat{k}$, $\vec{b} = 2\hat{i} + 4\hat{j} - n\hat{k}$ and $\vec{c} = \hat{i} + n\hat{j} + 3\hat{k} (n \geq 0)$, is 158 cu. Units , then :

A. $\vec{a} \cdot \vec{c} = 17$

B. $\vec{b} \cdot \vec{c} = 10$

C. $n = 7$

D. $n = 9$

Answer:

Watch Video Solution

153. If $S = \tan^{-1}\left(\frac{1}{3}\right) + \tan^{-1}\left(\frac{1}{7}\right) + \tan^{-1}\left(\frac{1}{13}\right) + \ldots$ to 10 terms. Find $\tan S$

A. $\frac{5}{6}$

B. $\frac{5}{11}$

C. $-\frac{6}{5}$

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

Answer:

Watch Video Solution

154. If four complex number $z, \bar{z}, \bar{z} - 2Re(\bar{z})$ and $z - 2Re(z)$ represent the vertices of a square of side 4-units in the Argand plane than find $|z|$.

A. $4\sqrt{2}$

B. 4

C. $2\sqrt{2}$

D. 2

Answer:

Watch Video Solution

155. A survey shows that 73 % of the persons working in an office like coffee , whereas 65% like tea . If x denotes the percentage of them, who like both coffee and tea , then x cannot be :

A. 63

B. 36

C. 54

D. 38

Answer:

Watch Video Solution

156. If the co-ordinates of two point A and B are $(\sqrt{7}, 0)$ and $(-\sqrt{7}, 0)$ respectively and P is any point on the curve $9x^2 + 16y^2 = 144$, then find $AP + PB$.

A. 16

B. 8

C. 6

D. 9

Answer:

Watch Video Solution

157. If the point P on the curve $4x^2 + 5y^2 - 20 = 0$ is farthest from the point $Q(0, -4)$ than Find PQ^2.

A. 36

B. 48

C. 21

D. 29

Answer:

Watch Video Solution

158. Let $\lambda \in R$. The system of linear equations

$2x_1 - 4x_2 + \lambda x_3 = 1$

$x_1 - 6x_2 + x_3 = 2$

$\lambda x_1 - 10x_2 + 4x_3 = 3$

is inconsistent for :

A. exactly one negative value of λ

B. exactly one positive value of λ

C. every value of λ

D. exactly two values of λ

Answer: A

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159. If min and max value of the function $f:\left[\frac{\pi}{4}, \frac{\pi}{2}\right] \rightarrow R, f(\theta)=\begin{vmatrix}-\sin^2\theta & -1-\sin^2\theta & 1 \\ -\cos^2\theta & -1-\sin^2\theta & 1 \\ 12 & -4 & 0\end{vmatrix}$ are m and M. Find the ordered pair (m, M).

A. $(0, 2\sqrt{2})$

B. $(-4, 0)$

C. $(-4, 0)$

D. $(0, 4)$

Answer:

Watch Video Solution

160. If (a, b, c) is the image of the point $(1, 2, -3)$ in the line $\frac{x+1}{2}=\frac{y-3}{-2}=\frac{z}{-1}$ then Find $a+b+c$.

A. 2

B. -1

C. 3

D. 1

Answer:

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161. If function $f(x) = \begin{cases} k_1(x-\pi)^2 - 1 & x \leq \pi \\ k_2 \cos x & x > \pi \end{cases}$ is twice differentiable in ordered pair (k_1, k_2). Find this ordered pair.

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

B. $(1, 0)$

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

D. $(1, 1)$

Answer:

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162. If common tangent to parabola $y^2 = 4x$ and $x^2 = 4y$ also touches the circle $x^2 + y^2 = c^2$, then find the value of C.

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

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

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

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

Answer:

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163. If α is a positive root of $p(x) = x^2 - x - 2$ Find $\lim_{x \to \alpha^+} \frac{\sqrt{1 - \cos(p(x))}}{x - 2}$

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

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

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

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

Answer:

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164. $\int(e^{2x}+2e^{x}-e^{-x}-1)e^{e^{x}+e^{-x}}dx=g(x)e^{e^{x}+e^{-x}}$, then find $g(0)$.

A. e

B. e^{2}

C. 1

D. 2

Answer:

Watch Video Solution

165. The value of $\int_{\frac{-\pi}{2}}^{\frac{\pi}{2}} \frac{1}{1+e^{\sin x}} dx$ is :

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

B. π

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

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

Answer:

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166. Let f (x) = $x.\left[\frac{x}{2}\right]$ for $-10 < x < 10$, where [t] denotes the greatest integer function . Then the number of points of discontinuity of f is equal to ______.

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167. If the distance of line $2x - y + 3 = 0$ from $4x - 2y + p = 0$ and $6x - 3y + r = 0$ is respectively $\frac{1}{\sqrt{5}}$ and $\frac{2}{\sqrt{5}}$

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168. The number of four letters word while each consisting 2 distinct and two alike letters taken from eord $SYLLABUS$

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169. The natural number m , for which the coefficient of x in the binomial expansion of $\left(x^m + \frac{1}{x^2}\right)^{22}$ is 1540 , is ______.

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170. Four different dice are thrown independently 27 times, then find the expectation of number of times if at leat two of them shows either 5 or 3.

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171. If α and β be two roots of the equation $x^2 - 64x + 256 = 0$. Then the value of $\left(\frac{\alpha^3}{\beta^5}\right)^{\frac{1}{8}} + \left(\frac{\beta^3}{\alpha^5}\right)^{\frac{1}{8}}$ is :

A. 2

B. 3

C. 1

D. 4

Answer:

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172. The area (in sq. units) of the region $A = \left\{(x, y) : |x| + |y| \leq 1, 2y^2 \geq |x|\right\}$ is :

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

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

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

D. $\frac{5}{6}$

Answer:

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173. Find the general solution of the differential equation

$$\sqrt{1+x^2+y^2+x^2y^2}+xy\frac{dy}{dx}=0.$$

A. $\sqrt{1+y^2}+\sqrt{1+x^2}=\frac{1}{2}\log_e\left(\frac{\sqrt{1+x^2}+1}{\sqrt{1+x^2}-1}\right)+C$

B. $\sqrt{1+y^2}-\sqrt{1+x^2}=\frac{1}{2}\log_e\left(\frac{\sqrt{1+x^2}+1}{\sqrt{1+x^2}-1}\right)+C$

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

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

Answer:

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174. Let L_1 be a tangent to the parabola $y^2 = 4(x+1)$ and L_2 be a tangent to the parabola $y^2 = 8(x+2)$ such that L_1 and L_2 intersect at right angles. Then L_1 and L_2 meet on the straight line :

A. x+3 =0

B. 2x+1=0

C. x+2=0

D. x+2y=0

Answer:

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175. If $f(x+y) = f(x)f(y)$ and $\sum_{x=1}^{\infty} f(x) = 2, x, y \in N,$ where N is the set of all natural numbers , then the value of $\frac{f(4)}{f(2)}$ is :

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

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

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

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

Answer:

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176. Let $I_1 = \int_0^1 \left(1 - x^{50}\right)^{100} dx$ and $I_2 = \int_0^1 \left(1 - x^{50}\right)^{101} dx$ and $I_1 = \lambda I_2$, then λ is

A. $\frac{5049}{5050}$

B. $\frac{5050}{5049}$

C. $\frac{5050}{5051}$

D. $\frac{5051}{5050}$

Answer:

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177. Out of 11 consecutive natural numbers if three number are selected at random (without repetition) , then the probability that they are in A.P. with positive common difference , is :

A. $\frac{15}{101}$

B. $\frac{5}{101}$

C. $\frac{5}{33}$

D. $\frac{10}{99}$

Answer:

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178. A ray of light coming from the point $(2, 2\sqrt{3})$ is incident at an angle 30° on the line x=1 at the point A . The ray gets reflected on the line x=1 and meet x-axis at the point B . Then , the line AB passes through the point :

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

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

C. $(3, -\sqrt{3})$

D. $(4, -\sqrt{3})$

Answer:

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179. Which of the following points lies on the locus of the foot of perpendicular drawn upon any tangent to the ellipse , $\frac{x^2}{4} + \frac{y^2}{2} = 1$ from any of its foci ?

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

B. $(-1, \sqrt{2})$

C. $(-1, \sqrt{3})$

D. $(1, 2)$

Answer:

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180. The region represented by $\{z = x + iy \in C : |z| - \text{Re}(z) \leq 1\}$ is also given by the inequality :

A. $y^2 \geq 2(x+1)$

B. $y^2 \leq 2\left(x + \frac{1}{2}\right)$

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

D. $y^2 \geq x + 1$

Answer:

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181. The position of a moving car at time t is given by $f(t) = at^2 + bt + c, t > 0$, where a ,b and c are real numbers greater than 1. Then the average speed of the car over the time interval $[t_1, t_2]$ is attained at the point :

A. $(t_2 - t_1)/2$

B. $a(t_2 - t_1) + b$

C. $(t_1 + t_2)/2$

D. $2a(t_1 + t_2) + b$

Answer:

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182. $\lim_{x \to 1}\left(\frac{\int_0^{(x-1)} t\cos(t)dt}{(x-1)\sin(x-1)}\right)$

A. is equal to $\frac{1}{2}$

B. is equal to 1

C. is equal to $-\frac{1}{2}$

D. does not exist

Answer:

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183. If $\sum_{i=1}^{n}(x_i - a) = n$ and $\sum_{i=1}^{n}(x_i - a)^2 = na$ then the standard deviation of variate x_i

A. a-1

B. $n\sqrt{a-1}$

C. $\sqrt{n(a-1)}$

D. $\sqrt{a-1}$

Answer:

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184. If $\{p\}$ denotes the fractional part of the number p , then $\left\{\frac{3^{200}}{8}\right\}$, is equal to :

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

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

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

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

Answer:

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185. The shortest distance between the lines $\frac{x-1}{0} = \frac{y+1}{-1} = \frac{z}{1}$ and $x+y+z+1=0, 2x-y+z+3=0$ is :

A. 1

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

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

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

Answer:

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186. The negation of the Boolean expression $p \vee (\sim p \wedge q)$ is equivalent to

:

A. $p \wedge \sim q$

B. $\sim p \wedge \sim q$

C. $\sim p \vee \sim q$

D. $\sim p \vee q$

Answer:

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187. Two families with three members each and one family with four members are to be estated in a row. In how many ways can they be setated so that the same familymembers are not separated ?

A. $2!3!4!$

B. $(3!)^3 \cdot (4!)$

C. $(3!)^2 \cdot (4!)$

D. $3!(4!)^3$

Answer:

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188. Let m and M be respectively the minimum and maximum values of

$$\begin{vmatrix} \cos^2 x & 1+\sin^2 x & \sin 2x \\ 1+\cos^2 x & \sin^2 x & \sin 2x \\ \cos^2 x & \sin^2 x & 1+\sin 2x \end{vmatrix}$$

Then the ordered pari (m , M) is equal to :

A. (-3, -1)

B. $(1, 3)$

C. $(-3, 3)$

D. $(-4, -1)$

Answer: A

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189. Let a,b,c,d and p be any non zero distinct real numbers such that $(a^2+b^2+c^2)p^2-2(ab+bc+cd)p+(b^2+c^2+d^2)=0$. Then :

A. a,c,p are in A.P.

B. a,c,p, are in G.P.

C. a,b,c,d are in G.P.

D. a,b,c,d are in A.P.

Answer:

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190. The value of λ and μ for which the system of linear equation

$x+y+z=2$

$x + 2y + 3z = 5$

$x + 3y + \lambda z = \mu$

has infinitely many solutions are , respectively :

A. 5 and 8

B. 5 and 7

C. 4 and 9

D. 6 and 8

Answer: A

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191. Set A has m element and Set B has n element . If the total numbers of subsets of A is 112 more than the total number of subsets of B, then the value of m.n is ___________

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192. Let $f: R \rightarrow R$ be defined as $f(x) = \begin{cases} x^5 \sin\left(\frac{1}{x}\right) + 5x^2, & x < 0 \\ 0, & x = 0 \\ x^5 \cos\left(\frac{1}{x}\right) + \lambda x^2, & x > 0 \end{cases}$

The value of λ for which $f''(0)$ exists , is __________

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193. If $\vec{a}$ and $\vec{b}$ are unit vectors, then the greatest value of $\sqrt{3}\left|\vec{a} + \vec{b}\right| + \left|\vec{a} - \vec{b}\right|$ is ________

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194. Let AD and BC be two vertical poles at A and B respectively on a horizontal ground . If $AD = 8m$, $BC = 11m$ and AB=10 m, then the distance (in meters) of a point M on AB from the point A such that $MD^2 + MC^2$ is miniumu is ______________

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195. The angle of elevation of the top of a hill from a point on the horizontal planes passing through the foot of the hill is found to be 45° . After walking a distance of 80 meters towards the top , up a slope inclined at an angle of 30° to the horizontal plane , the angle of elevation of the top of the hill becomes 75° . Then the height of the hill (in meters) is ________

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196. Let $f : R \rightarrow R$ be a function which satisfies $f(x+y) = f(x) + f(y) \forall x, y \in R.$ If $f(1) = 2$ and $g(n) = \sum_{k-1}^{(n-1)} f(k), n \in N$ then the value of n , for which $g(n) = 20$, is :

A. 9

B. 5

C. 4

D. 20

Answer: B

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197. If the sum of first 11 terms of an $A.P., a_1, a_2, a_3, ...$ is $0(a_1 \neq 0)$ then the sum of the $A.P., a_1, a_3, a_5, ..., a_{23}$ is ka_1, where k is equal to :

A. $-\frac{121}{10}$

B. $-\frac{72}{5}$

C. $\frac{72}{5}$

D. $\frac{121}{10}$

Answer: B

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198. Let E^C denote the complement of an event E. Let E_1, E_2 and E_3 be any pairwise independent events with $P(E_1) > 0$ and $P(E_1 \cap E_2 \cap E_3) = 0$. Then $P\left(E_2^C \cap E_3^C / E_1\right)$ is equal to :

A. $P\left(E_3^C\right) - P\left(E_2^C\right)$

B. $P(E_3) - P\left(E_2^C\right)$

C. $P\left(E_3^C\right) - P(E_2)$

D. $P\left(E_2^C\right) + P(E_3)$

Answer: C

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199. If the equation $\cos^4\theta + \sin^4\theta + \lambda = 0$ has real solutions for θ, then λ lies in the interval :

A. $\left(-\frac{1}{2}, -\frac{1}{4}\right]$

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

C. $\left[-\frac{3}{2}, -\frac{5}{4}\right]$

D. $\left(-\frac{5}{4}, -1\right)$

Answer: B

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200. An equilateral trinagle is inscribed in parabola $y^2 = 8x$ whose one vertex coincides with vertex of parabola.Find area of triangle.

A. $128\sqrt{3}$

B. $192\sqrt{3}$

C. $64\sqrt{3}$

D. $256\sqrt{3}$

Answer: B

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201. Find the imaginary part of $\left((3+2\sqrt{-54})^{\frac{1}{2}}-(3-2\sqrt{-54})^{\frac{1}{2}}\right)$

A. $\sqrt{6}$

B. $-2\sqrt{6}$

C. 6

D. $-\sqrt{6}$

Answer: B

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202. A plane passing through the point (3,1,1) contains two lines whose direction ratios are 1,–2,2 and 2,3, –1 respectively. If this plane also passes through the point $(\alpha, -3, 5)$, then α is equal to:

A. -5

B. 10

C. 5

D. -10

Answer: C

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203. Let $A = \left\{X = (x, y, z)^T : PX = 0 \text{ and } x^2 + y^2 + z^2 = 1\right\}$,

where $P = \begin{bmatrix} 1 & 2 & 1 \\ -2 & 3 & -4 \\ 1 & 9 & -1 \end{bmatrix}$, then the set A:

A. contains more than two elements

B. is a singleton.

C. contains exactly two elements

D. is an empty set.

Answer: C

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204. The equation of the normal to the curve $y = (1 + x)^{2y} + \cos^2(\sin^{-1} x)$ at $x = 0$ is :

A. $y + 4x = 2$

B. $2y + x = 4$

C. $x + 4y = 8$

D. $y = 4x + 2$

Answer: C

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205. Consider a region $R = \{(x, y) \in R^2 : x^2 \le y \le 2x\}$. If a line $y = \alpha$ divides the area of region R into two equal parts, then which of the following is true.?

A. $\alpha^3 - 6\alpha^2 + 16 = 0$

B. $3\alpha^2 - 8\alpha^{3/2} + 8 = 0$

C. $\alpha^3 - 6\alpha^{3/2} - 16$

D. $3\alpha^2 - 8\alpha + 8 = 0$

Answer: B

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206. Let $f:(-1, \infty) \rightarrow R$ be defined by $f(0) = 1$ and $f(x) = \frac{1}{x}\log_e(1 + x), x \neq 0$. Then the function f:

A. increases in $(-1, \infty)$

B. decreases in (–1,0) and increases in $(0, \infty)$

C. increases in (–1,0) and decreases in $(0, \infty)$

D. decreases in $(-1, \infty)$.

Answer: D

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207. Which of the following is a tautology?

A. $(p \rightarrow q) \wedge (q \rightarrow p)$

B. $(\sim p) \wedge (p \vee q) \rightarrow q$

C. $(q \rightarrow p) \vee \sim(p \rightarrow q)$

D. $(\sim q) \vee (p \wedge q) \rightarrow q$

Answer: B

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208. If $f(x)$ be a quadratic polynomial such that $f(x) = 0$ has a root 3 and $f(2) + f(-1) = 0$ then other root lies in

A. (0, 1)

B. (1, 3)

C. (-1, 0)

D. (-3,-1)

Answer: C

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209. Let S be the sum of the first 9 terms of the series :

$\{x + ka\} + \{x^2 + (k+2)a\} + \{x^3 + (k+4)a\} + \{x^4 + (k+6)a\} + \dots$

where $a \neq 0$ and $a \neq 1$.

If $S = \dfrac{x^{10} - x + 45a(x-1)}{x-1}$, then k is equal to :

A. 3

B. -3

C. 1

D. -5

Answer: B

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210. The set of all possible values of θ in the interval $(0, \pi)$ for which the points (1,2) and $(\sin\theta, \cos\theta)$ lie on the same side of the line $x + y = 1$ is:

A. $\left(0, \frac{\pi}{4}\right)$

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

C. $\left(0, \frac{3\pi}{4}\right)$

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

Answer: B

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211. There are n stations in a circular path.Two consecutive stations are connected by blue line and two non-consecutive stations are connected by red line.If no. of red lines is equal to 99 times number of blue line then value of n is

A. 201

B. 199

C. 101

D. 200

Answer: A

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212. If a curve $y = f(x)$ satisfy the differential equation $2x^2 dy = (2xy + y^2) dx$ and passes $(1, 2)$ the find $f\left(\frac{1}{2}\right)$

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

B. $1 + \log_e 2$

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

D. $\frac{1}{1 - \log_e 2}$

Answer: C

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213. If $x^2 - y^2 \sec^2\theta = 10$ be a hyperbola and $x^2 \sec^2\theta + y^2 = 5$ be an ellipse such that the eccentricity of hyperbola=$\sqrt{5}$ eccentricity of ellipse then find the length of latus rectum of ellipse

A. $\frac{4\sqrt{5}}{3}$

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

C. $2\sqrt{6}$

D. $\sqrt{30}$

Answer: A

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214. Find $(\lim)_{x \to 0}\left\{\tan\left(\frac{\pi}{4} + x\right)\right\}^{1/x}$

A. e

B. e^2

C. 2

D. 1

Answer: B

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215. Let a, b, c $\in$ R be all non-zero and satisfy $a^3 + b^3 + c^3 = 2$. If the matrix

$$A = \begin{pmatrix} a & b & c \\ b & c & a \\ c & a & b \end{pmatrix}$$

satisfies $A^T A = I$, then a value of abc can be :

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

B. 3

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

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

Answer: D

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216. Let the position vectors of points 'A' and 'B' be $\hat{i}+\hat{j}+\hat{k}$ and $2\hat{i}+\hat{j}+3\hat{k}$, respectively. A point 'P' divides the line segment AB internally in the ratio $\lambda:1(\lambda>0)$. If O is the origin and $\overrightarrow{OB}.\overrightarrow{OP}-3\left|\overrightarrow{OA}\times\overrightarrow{OP}\right|^2=6$, then λ is equal to _______

A.

B.

C.

D.

Answer: 0.8

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217. Let [x] denote the greatest integer less than or equal to x. Then the value of $\int_1^2 |2x-[3x]|dx$ is _____

A.

B.

C.

D.

Answer: 1

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218. If $y = \sum_{k=1}^{6} K \cos^{-1}\left(\frac{3}{5}\cos kx - \frac{4}{5}\sin kx\right)$ then $\frac{dy}{dx} =$

A.

B.

C.

D.

Answer: 91

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219. If the variance of the terms in an increasing $A.P.$, $b_1, b_2, b_3, \ldots, b_{11}$ is 90, then the common difference of this A.P. is _____

A.

B.

C.

D.

Answer: 3

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220. For a positive integer n, $\left(1+\frac{1}{x}\right)^n$ is expanded in increasing powers of x. If three consecutive coefficients in this expansion are in the ratio, $2:5:12$, then n is equal to _____

A.

B.

C.

D.

Answer: 118

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221. If the system of linear equations

$x + y + 3z = 0$

$x + 3y + k^2 z = 0$

$3x + y + 3z = 0$

has a non -zero solution (x, y, -z) for some k $\in$ R then $x + \left(\frac{y}{z}\right)$ is equal to :

A. 9

B. -3

C. -9

D. 3

Answer: D

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222. If α and β are the roots of the equation, $7x^2 - 3x - 2 = 0$, then the value of

$\frac{\alpha}{1-\alpha^2} + \frac{\beta}{1+\beta^2}$ is equal to :

A. $\frac{27}{32}$

B. $\frac{1}{24}$

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

D. $\frac{27}{16}$

Answer:

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223. If x = 1 is a critical point of the function $f(x) = (3x^2 + ax - 2 - a)e^x$, then :

A. x = 1 and $x = -\frac{2}{3}$ are local minima of f .

B. x =1 and $x = -\frac{2}{3}$ are local maxima of f .

C. x = 1 is a local maxima and $x = -\frac{2}{3}$ is a local minima of f .

D. x = 1 is a local minima and $x = -\frac{2}{3}$ is a local maxima of f .

Answer:

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224. The area (in sq. units) of the region $A = \{(x, y) : (x - 1)[x] \le y \le 2\sqrt{x}, 0 \le x \le 2]$ where [t] denotes the greatest integer function is

A. $\frac{8}{3}\sqrt{2} - \frac{1}{2}$

B. $\frac{4}{3}\sqrt{2} + 1$

C. $\frac{8}{3}\sqrt{2} - 1$

D. $\frac{4}{3}\sqrt{2} - \frac{1}{2}$

Answer:

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225. If the sum of the second , third and fourth terms of a positive term G.P is 3 and the sum of its sixth , seventh and eight terms is 243, then the sum of the first 50 terms of this G.P is :

A. $\frac{1}{26}\left(3^{49} - 1\right)$

B. $\frac{1}{26}\left(3^{50} - 1\right)$

C. $\frac{2}{13}\left(3^{50} - 1\right)$

D. $\frac{1}{13}\left(3^{50} - 1\right)$

Answer: A::C

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226. $\left(\frac{-1+\sqrt{3}i}{1-i}\right)^{30}$ simplifies to

A. -2^{15}

B. 2^{15}

C. $-2^{15}i$

D. 6^5

Answer:

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227. If $L=\sin^2\left(\frac{\pi}{16}\right)-\sin^2\left(\frac{\pi}{8}\right)$ and $M=\cos^2\left(\frac{\pi}{16}\right)-\sin^2\left(\frac{\pi}{8}\right)$, then :

A. $L=-\frac{1}{2\sqrt{2}}+\frac{1}{2}\cos\left(\frac{\pi}{8}\right)$

B. $L=\frac{1}{4\sqrt{2}}-\frac{1}{4}\cos\left(\frac{\pi}{8}\right)$

C. $M=\frac{1}{4\sqrt{2}}+\frac{1}{4}\cos\left(\frac{\pi}{8}\right)$

D. $M=\frac{1}{2\sqrt{2}}+\frac{1}{2}\cos\left(\frac{\pi}{8}\right)$

Answer:

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228. If $a+x=b+y=c+z+1$, where a, b,c,x,y,z are non polar distinct real numbers , then $\begin{vmatrix} x & a+y & x+a \\ y & b+y & y+b \\ z & c+y & z+c \end{vmatrix}$ is equal to :

A. 0

B. $y(a-b)$

C. $y(b-c)$

D. $y(a-c)$

Answer: B

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229. If the line y = mx + c is a common tangent to the hyperbola $\frac{x^2}{100} - \frac{y^2}{64} = 1$ and the circle $x^2 + y^2 = 36$, then which one of the following is ture ?

A. $c^2 = 369$

B. 5m=4

C. $4c^2 = 369$

D. $8m + 5 = 0$

Answer:

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230. Which of the following points lies on the tangent to the curve $x^4 e^y + 2\sqrt{y+1} = 3$ at the point (1, 0)?

A. (2, 2)

B. (2, 6)

C. (-2, 6)

D. (-2, 4)

Answer:

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231. The statement

$(p \rightarrow (q \rightarrow p)) \rightarrow (p \rightarrow (p \vee q))$ is :

A. equivalent to $(p \wedge q) \vee (\sim q)$

B. a contradiction

C. equivalent to $(p \vee q) \wedge (\sim p)$

D. a tautology

Answer:

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232. $\lim_{x \to 0} \frac{x\left(e^{\frac{\sqrt{1+x^2+x^4}-1}{x}}-1\right)}{\sqrt{1+x^2+x^4}-1}$

A. is equal to $\sqrt{e}$

B. is equal to 1

C. is equal to 0

D. does not exist

Answer:

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233. If the sum of the first 20 terms of the series

$\log_{\left(7^{1/2}\right)} x + \log_{\left(7^{1/3}\right)} x + \log_{\left(7^{1/4}\right)} x + \dots$ is 460 , then x is equal to :

A. 7^2

B. $7^{1/2}$

C. e^2

D. $7^{46/21}$

Answer:

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234. the derivation of $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ with respect to $\tan^{-1}\left(\frac{2x\sqrt{1-x^2}}{1-2x^2}\right)$

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

B. $\frac{\sqrt{3}}{12}$

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

D. $\frac{\sqrt{3}}{10}$

Answer:

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235. If $\int \frac{\cos\theta}{5+7\sin\theta-2\cos^2\theta}d\theta = A\log_e|B(\theta)|+C$

where C is a constant of integration, then $\frac{B(\theta)}{A}$ can be :

A. $\frac{2\sin\theta+1}{\sin\theta+3}$

B. $\frac{2\sin\theta+1}{5(\sin\theta+3)}$

C. $\frac{5(\sin\theta+3)}{2\sin\theta+1}$

D. $\frac{5(2\sin\theta+1)}{\sin\theta+3}$

Answer: D

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236. Let y = y (x) be the solution of the differential equation

$\cos x\frac{dy}{dx}+2y\sin x = \sin 2x, x \in \left(0, \frac{\pi}{2}\right).$

If $y(\pi/3) = 0, \quad \text{then} \quad y(\pi/4)$ is equal to :

A. $2-\sqrt{2}$

B. $2+\sqrt{2}$

C. $\sqrt{2}-2$

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

Answer: C

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237. If the length of the chord of the circle , $x^2+y^2=r^2(r>0)$ along the line , $y-2x=3$ is r, then r^2 is equal to

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

B. 12

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

D. $\frac{12}{5}$

Answer: D

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238. If the mean and the standard deviation of the data 3,5,7,a,b are 5 and 2 respectively, then a and b are the roots of the equation :

A. $x^2 - 10x + 18 = 0$

B. $2x^2 - 20x + 19 = 0$

C. $x^2 - 10x + 19 = 0$

D. $x^2 - 20x + 18 = 0$

Answer:

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239. If for some $\alpha \in R,$ the lines

$L_1 : \frac{x+1}{2} = \frac{y-2}{-1} = \frac{z-1}{1}$ and

$L_2 : \frac{x+2}{\alpha} = \frac{y+1}{5-\alpha} = \frac{z+1}{1}$ are coplanar , then the line L_2 passes through the point :

A. (10, 2, 2)

B. (2, - 10, - 2)

C. (10, -2, -2)

D. (-2, 10 , 2)

Answer:

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240. There are three sections in a question paper, each containing 5 questions. A candidate has to solve any 5 questions, choosing at least one from each section. Find the number of ways in which the candidate can choose the questions.

A. 3000

B. 1500

C. 2255

D. 2250

Answer:

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241. Find the coefficient of x^4 in the expansion of $\left(1+x+x^2+x^3\right)^6$

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242. In a bombing attack , there is 50% chance that a bomb will hit target . At least two independent hits are required to destroy the target completely. Then the minimum number of bombs, that must be dropped to ensure that there is at least 90% chance of completely destroying the target , is _______

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243. If the lines x + y =a and x - y = b touch the curves $y=x^2-3x+2$ at points where the curve intersects the x - axis then $\frac{a}{b}$ is equal to _____.

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244. Let the vectors $\vec{a}, \vec{b}, \vec{c}$ be such that $|\vec{a}| = 2|\vec{b}| = 4$ and $|\vec{c}| = 4$. If the projection of $\vec{b}$ on $\vec{a}$ is equal to the projection of $\vec{c}$ on $\vec{a}$ and $\vec{b}$ is perpendicular to $\vec{c}$, then the value of $|\vec{a} + \vec{b} - \vec{c}|$ is ______ .

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245. Let A = { a, b,c } and B = {1, 2, 3, 4} . Then the number of elements in the set C = { f : $A \to B \mid 2 \in f(A)$ and f is not one-one } is

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246. The consists of 6 multiple choice questions, each having 4 alternative answers of wihc only one is correct. The number of ways, in which a canditate answers all six questions such that exactly four of the answers are correct, is ______.

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247. If $\vec{a} = 2\hat{i} + \hat{j} + 2\hat{k}$, then the value of $\left|\hat{i} \times \left(vaca \times \hat{i}\right)\right|^2 + \left|\hat{i} \times \left(\vec{a} \times \hat{j}\right)\right|^2 + \left|\hat{k} \times \left(\vec{a} \times \hat{k}\right)\right|^2$ equal to ______

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248. Let {x} and [x] denote the fractional part of x and the greatest interger $\leq x$ respectively of a real number x. if $\int_0^n \{x\}dx, \int_0^n [x]dx$ and $10\left(n^2 - n\right), \ (n \in N, n > 1)$ are three consecutive terms of a G.P then n is equal to _____.

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249. If the variance of the following frequency distribution ,

Class	:	10-20	20-30	30-40
Frequency	:	2	x	2

is 50, then x is equal to ____.

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250. Let PQ be a diameter of the circle $x^2 + y^2 = 9$ If α and β are the lengths of the perpendiculars from P and Q on the straight line, x+y=2 respectively, then the maximum value of $\alpha\beta$ is _____.

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