doubtnut
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MATHS

BOOKS - UNITED BOOK HOUSE

SET 4

Exercise

1. $\sin\left(\cot^{-1} x\right)=$

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

B. x

C. $\left(1+x^2\right)^{-3/2}$

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

Answer:

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2. If the rate of change of area of circle is equal to the rate of change of its diameter, then its radius =

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

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

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

D. π

Answer:

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3. If $\vec{a}, \vec{b}$ are two vectors such that $\vec{a}.\vec{b} < 0$ and $\left|\vec{a}.\vec{b}\right| = \left|\vec{a} \times \vec{b}\right|$ then the angle between $\vec{a}$ and $\vec{b}$ is

A. π

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

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

D. $\frac{2\pi}{4}$

Answer:

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4. If the straight line $\frac{x-11}{3} = \frac{y-2}{m} = \frac{z+3}{-2}$ is parallel to the plane x-3y+6z+7 = 0 then value of m is

A. -1

B. -2

C. 3

D. -3

Answer:

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5. Show that , $\cos^{-1}\frac{4}{5}+\cot^{-1}\frac{5}{3}=\tan^{-1}\frac{27}{11}$

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6. answer any one question $A=\begin{bmatrix}1 & 0\\ -1 & 7\end{bmatrix}$ and I be the unit matrix of second order. If $A^2=8A+kI$, then find the value of k.

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7. Without expanding show that $\begin{vmatrix}\frac{1}{a} & 1 & bc\\ \frac{1}{b} & 1 & ca\\ \frac{1}{c} & 1 & ab\end{vmatrix}=0$

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8. f(x) = $\begin{cases} \frac{|x+1|}{x+1} & when x \neq -1 \\ 0 & when x = -1 \end{cases}$

Test whether f(x) is continuous or not at x= -1

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9. Find the value of c that occurs in the conclusion of lagrange's MVT in the funciton $f(x) = \sqrt{16 - x^2}$ in [0,4]

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10. Solve: (x-y)(dx+dy) = dx-dy when x= 0, y = -1

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11. For any two vectors $\vec{a}$ and $\vec{b}$ show that $\left|\vec{a} . \vec{b}\right| \leq \left|\vec{a}\right| . \left|\vec{b}\right|$

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12. Show that the condition for the lines $x = a_1z + b_1, y = c_1z + d_1$ and $x = a_2z + b_2, y = c_2z + d_2$ be perpendicular is $a_1a_2 + c_1c_2 = 0$

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13. Can the two events A and B be mutually exclusive if $P(A) = \frac{1}{8}, P(A/B) = \frac{1}{8}$ and $P(B/A) = \frac{1}{4}$? Justify your answer with reason.

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14. Let * be a binary operation defined by a* b = L.C.M , $(a, b) \forall a, b \in N$. Show that the binary operation * defined on N is commutative and associative. Also find its identity element of N.

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15. Solve: $\sin^{-1} x + \sin^{-1}(1-x) = \cos^{-1} x$

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16. Show that, $A = \frac{1}{3}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & -1 \\ -2 & 2 & -1 \end{bmatrix}$ are orthogonal matrix and hence find A^{-1}.

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17. Prove that $\begin{vmatrix} x & a & b \\ a & x & b \\ a & b & x \end{vmatrix} = (x-a)(x-b)(x+a+b)$

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18. Prove that $\begin{vmatrix} b+c & a-b & a \\ c+a & b-c & b \\ a+b & c-a & c \end{vmatrix} = 3abc - a^3 - b^3 - c^3.$

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19. If $y = \sin^{-1}\left\{\frac{5x + 12\sqrt{1-x^2}}{13}\right\}$ then show that $\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$

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20. If $\left(\sqrt{1-x^2}\right)y = \sin^{-1}x$ then show that $\left(1-x^2\right)y_2 - 3xy_1 - y = 0$

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21. Evaluate: $\int \frac{\sin^{-1}x}{(1-x^2)^{3/2}}dx$

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22. Evaluate: $\int \frac{dx}{\sqrt{\frac{2}{3}x^3 - x^2 + \frac{1}{3}}}$

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23. Solve: $x\frac{dy}{dx} + 3y = x^2$

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24. Solve: $\left(x^2 + y^2\right)dy - xydx = 0$

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25. If $2\vec{a} + 3\vec{b} + \vec{c} = \vec{0}$, then show that $\vec{a} \times \vec{b} + \vec{b} \times \vec{c} + \vec{c} \times \vec{a} = 3\left(\vec{b} \times \vec{c}\right)$.

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26. If $\vec{a} = -\hat{i} + \hat{j} + 2\hat{k}$, $\vec{b} = 2\hat{i} - \hat{j} - \hat{k}$, and $\vec{c} = -2\hat{i} + \hat{j} + 3\hat{k}$ then find the angle between $2\vec{a} - \vec{c}$ and $\vec{a} + \vec{b}$.

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27. Prove that $\int_{-5}^{0} \{|x| + |x+2| + |x+5|\} dx = \frac{63}{2}$

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28. Prove that

$$\lim_{n \to \infty} \left[\frac{1}{n} + \frac{\sqrt{n^2 - 1^2}}{n^2} + \frac{\sqrt{n^2 - 2^2}}{n^2} + \ldots . \frac{\sqrt{n^2 - (n-1)^2}}{n^2} \right] = \frac{\pi}{4}$$

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29. For two events A and B [with $P(B) \neq 0$], show that $P(A/\overline{B}) = P(A).\dfrac{1-P(B/A)}{1-P(B)}$

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30. The sum and product of the mean and variance of a bionimial distribution are 12 and 32 respectively. Find the distribution.

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31. If a triangle ABC inscribed in a fixed circle be slightly varies in such a way as to have its varies aways on the circle, then show that $\dfrac{da}{\cos A} + \dfrac{db}{\cos B} + \dfrac{dc}{\cos c} = 0$

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32. Obtain the equation of the curve passing through the point(4,3) and at any point the gradient of the tangent to the curve is the reciprocal of the ordinate of the point.

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33. find the co-ordinate of the point on the cute $y = \frac{x^2 - 1}{x^2 + 1}$ (x>0) where the gradient of the tangent to the curve is maximum.

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34. Find the value of λ for which the vectors 3i-2j-k,2i+3j-4k,-i+j+2k and $4i + 5j + \lambda k$ are coplanar.

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