MATHS

BOOKS - UNITED BOOK HOUSE

SET 5

Exercise

1. The principal value of $\sin^{-1}\sin\left(\frac{3\pi}{4}\right)$ is

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

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

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

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

Answer:

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2. If A is a square matrix, then A-A' is

A. unit matrix

B. null matrix

C. A

D. a skew symmetric matrix

Answer:

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3. If $y = \tan^{-1}\left(\frac{1-x}{1+x}\right)$, then $\left.\frac{dy}{dx}\right|_{x=1}$

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

B. -1

C. 0

D. 1

Answer:

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4. If f(x) is an add function then $\overset{a}{u}ndert(-a)f(x)dx$ is equal to

A. 2f(x)

B. $2\int_{-a}^{a} f(x)dx$

C. 0

D. overset(a)underset(0)int f(x-a)dx`

Answer:

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5. If the rate of change of volume of a shpere is equal to the rate of the change of its radius then its radius=

A. 1

B. $\sqrt{2\pi}$

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

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

Answer:

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6. For two vectors $\vec{a}$ and $\vec{b}$, $\left(\vec{a}.\vec{b}\right)^2+\left(\vec{a}\times\vec{b}\right)^2$ =

A. $2\left|\vec{a}\right|^2\left|\vec{b}\right|^2$

B. $\left|\vec{a}\right|^2\left|\vec{b}\right|^2$

C. $\left|\vec{a}\right|^2+\left|\vec{b}\right|^2$

D. $\left|\overrightarrow{a}\right|^2 - \left|\overrightarrow{b}\right|^2$

Answer:

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7. The equation of a plane parallel to z-axis is

A. x= 0,y =0

B. z= 0

C. z= c

D. ax+by+d =0

Answer:

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8. A die thrown twice. If A is the event of getting a multiple of three in first through and B is the event of getting a sum less than 8 in two throws, then $P(A/B)$ =

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9. Prove that the binary operation O defined by $aob = a - b + ab,\ \forall a, b \in Q$ is not commutative and associative.

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10. The value of $\tan^2\left(\sec^{-1}2\right) + \cot^2\left(\cos ec^{-1}3\right)$ is

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11. Show that , $A = \frac{1}{3}\begin{bmatrix} -1 & 2 & -2 \\ -2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ is proper orthogonal matrix .

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12. Without expanding show that $\begin{vmatrix} 27 & 40 & 58 \\ 24 & 36 & 52 \\ 18 & 28 & 40 \end{vmatrix} = 0$

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13. If $f(x) = \begin{cases} \frac{\tan 3x}{4x} & x \neq 0 \\ k & x = 0 \end{cases}$, then for what value of K, f(x) is continuous.

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14. If $y = \sqrt{\frac{1-x}{1+x}}$ find $\frac{dy}{dx}$ and prove that $\left(1-x^2\right)\frac{dy}{dx} + y = 0$

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15. Evaluate: $\int \frac{x^2+1}{(x+1)^2} dx$

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16. Verify Rolle' theorem for the function $f(x) = x^2 - 4x + 3$ in $1 \leq x \leq 3$.

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17. solve : $\frac{dy}{dx} = \frac{1 - \cos x}{1 + \cos x}$

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18. Find the interval in which the function $f(x) = x^3 - 6x^2 + 9x + 5$ is decreasing.

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19. If $\vec{a} = 4\hat{i} - \hat{j} - 3\hat{k}$ and $\vec{b} = -2\hat{i} + \hat{j} + 2\hat{k}$ are the two diagonals of a parallelogram, then find its area.

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20. Find the equation of the plane passing through the point (4,1,1) and parallel to 3x-4y+7z+5 =0

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21. The mean and standard deviationg of a binomial distribution B(n,p) are 150 and 10 respectively. Then np^2=

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22. The value $2\tan^{-1}\left[\sqrt{\frac{a-b}{a+b}}\tan\left(\frac{\theta}{2}\right)\right]$ is equal to $\cos^{-1}\left(\frac{a\cos\theta+b}{a+b\cos\theta}\right)$ (b) $\cos^{-1}\left(\frac{a+b\cos\theta}{a\cos\theta+b}\right)$ $\cos^{-1}\left(\frac{a\cos\theta}{a+b\cos\theta}\right)$ (d) $\cos^{-1}\left(\frac{b\cos\theta}{a\cos\theta+b}\right)$

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23. If $A = \begin{bmatrix} 2 & -1 \\ 3 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 4 \\ -1 & 7 \end{bmatrix}$ then determine the matric $3A^2 - 2B + I$.

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24. If $[1x1] \times \begin{bmatrix} 1 & 3 & 2 \\ 2 & 5 & 1 \\ 15 & 3 & 2 \end{bmatrix} \times \begin{bmatrix} 1 \\ 2 \\ x \end{bmatrix} = 0$ then find the value of x.

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25. Solve for x

$$|x-2, 2x-3, 3x-4, x-4, 2x-9, 3x-16, x-8, 2x-27, 3x-64| =$$

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26. If $y = 2\frac{\sin^{-1}(x-2)}{\sqrt{6}} - \sqrt{2+4x-x^2}$, then show that $\frac{dy}{dx}|_{x=2} = \frac{2}{\sqrt{6}}$

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27. If t is a parameter and $x = t^2 + 2t, y = t^3 - 3t$ then show that $\frac{d^2y}{dx^2} = \frac{3}{4(t+1)}$.

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28. Evaluate : $\int \frac{dx}{3 + 2\sin x + \cos x}$

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29. Evaluate: $\int \frac{(x-1)dx}{(x-3)(x-2)}$

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

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31. Solve: xdx + y dy + xdy - ydx = 0

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32. If the position vector of A,B,C are 2i+4j-k,4i+5j+k and 3i+6j-3k respectively, then show that $\triangle ABC$ is right angle.

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33. Find a unit vector perpendicular to the plane of ABC where the position vectors of A,B,C are 3i-j+2k,i-j-3k and 4i-3j+k respectively.

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34. Prove that $\int_0^{\pi} \frac{x dx}{a^2 \cos^2 x + b^2 \sin^2 x} = \frac{\pi^2}{2ab}$

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35. Prove that $\int_0^3 (2x^2 + 3x + 5)\,dx = \frac{93}{2}$

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36. In a triangle ABC if the sides a, b be constant and the base angles A and B vary, then show that , $\frac{dA}{\sqrt{a^2 - b^2 \sin^2 A}} = \frac{dB}{\sqrt{b^2 - a^2 \sin^2 B}}$

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37. If $\vec{a}, \vec{b}, \vec{c}$ are unit vectors satisfying the condition $\vec{a} + \vec{b} + \vec{c} = 0$ then show that $\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a} = -3/2.$

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38. Find the distance of the point (0,-3,-2) from the plane x+2y-z =1 measured parallel to the line (x+1)/2=(y+1)/2=z/3`

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