MATHS

BOOKS - UNITED BOOK HOUSE

SET 3

Exercise

1. $\cos^{-1}\left(\frac{1}{2}\right) + 2\sin^{-1}\left(\frac{1}{2}\right)$ is equal to

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

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

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

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

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. symmetric matrix.

Answer:

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3. If f(x) = logx, then $\frac{d}{dx} f(\log x)$ =

A. $\frac{1}{x} . \log x$

B. $\frac{x}{\log x}$

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

D. x.log.x

Answer:

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4. If f(2a-x)=-f(x), then $\int_0^{2a} f(x)dx=$

A. 0

B. f(2a)

C. f(0)

D. f(2a)

Answer:

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5. If a particle moves along the parabola $y^2 = 8x$ then the co-ordinates of the point on which the rate of

change of abscissa is equal to the rate of change of ordinate, is

A. (4,2)

B. (2,4)

C. (2,2)

D. (4,4)

Answer:

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6. $i.\ (j \times k) + j.\ (i \times k) + k.\ (i \times j)$=

A. 1

B. 2

C. 3

D. -3

Answer:

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7. P(A) = 0.6,P(B) = 0.3,$P(B/A) = 0.2mP(A \cup B)$=

A. 0.84

B. 0.78

C. 0.12

D. 0.7

Answer:

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

A. 140

B. 200

C. 50

D. 100

Answer:

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9. Prove that the binary operation o defined by a o b = |a|+|b|, $\forall a, b \in R$ is commutative and associatie on R.

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10. Solve: $\sin^{-1} x - \cos^{-1} x = \frac{\pi}{6}$

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11. If $A = \begin{bmatrix} 0 & 2 \\ 3 & -4 \end{bmatrix}, kA = \begin{bmatrix} 0 & 3a \\ 2b & 24 \end{bmatrix}$ then find the value of k+a+b.

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12. 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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13. Show that ,

$$\frac{d}{dx}\left[\frac{x}{2}\sqrt{a^2-x^2}+\frac{a^2}{2}\frac{\sin^{-1}x}{a}\right]=\sqrt{a^2-x^2}$$

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14. Evaluate the following integral:

$$\int (\tan^{-1}) \sqrt{\frac{1-\sin x}{1+\sin x}} dx$$

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15. Find the value of C that occurs in the conclusion of largranges's MVT in the function $f(x) = x^2 - 2x + 3$ in [-2,2].

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16. Solve the following differential equations:

$$\frac{dy}{dx} = e^{x+y} + x^2 e^y$$

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17. If $\left|\vec{a}+\vec{b}\right|=\left|\vec{a}-\vec{b}\right|$,(where $\vec{a}$ and $\vec{b}$ are any vector) then show that $\vec{a}$ and $\vec{b}$ are perpendicular to each other.

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18. The cartesian equations of a line are x= ay+b,z= cy+d . Find its direction ratios.

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19. Events A and B are such that $P(A) = \frac{1}{2}, P(B) = \frac{7}{12}$ and $\mathrm{P}(\text{not A or not B}) = \frac{1}{4}$. State whether A and B are independent ?

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20. A binomial distribution B(n,p) has the mean 8 and variance $\frac{8}{3}$. Find the values of n and p.

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21. Show that $\cos^{-1}\left(\frac{\cos x + \cos y}{1 + \cos x . \cos y}\right) = 2\tan^{-1}\left(\tan\left(\frac{x}{2}\right) . \tan\left(\frac{y}{2}\right)\right)$

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22. By row transformation find inverse of the matrix $A = \begin{bmatrix} 1 & 3 & 2 \\ -3 & -3 & -1 \\ 2 & 1 & 0 \end{bmatrix}$

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

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24. Prove that, $\begin{vmatrix} (a+1)(a+2) & a+2 & 1 \\ (a+2)(a+3) & a+3 & 1 \\ (a+3)(a+4) & a+4 & 1 \end{vmatrix} = -2$

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25. If $y = 3e^{2x} + 2e^{3x}$ then show that $y_2 - 5y_1 + 6y = 0$

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26. If $x = \sqrt{a^{\sin^{-1}t}}$ and $y = \sqrt{a^{\cos^{-1}t}}$ show that $\frac{dy}{dx} = -\frac{y}{x}$.

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27. Evaluate: $\int \frac{\sin^{-1} x}{x^2 dx}$

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

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29. Solve: $\frac{dy}{dx} + \frac{y}{x} = e^x$

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

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31. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}, \vec{b} = \hat{i} + \hat{j}, \vec{c} = \hat{i}$ and $\left(\vec{a} \times \vec{b}\right) \times \vec{c} = \lambda \vec{a} + \mu \vec{b}$. Then show that $\lambda + \mu = 0$

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32. If $\vec{a} = \hat{i} + \hat{j} - \hat{k}, \vec{b} = -\hat{i} + 2\hat{j} + \hat{k}$ and $\vec{c} = -\hat{i} + 2\hat{j} - \hat{k}$, then show that the unit vector perpendicular to $\vec{a} + \vec{b}$ and $\vec{b} + \vec{c}$ is $\hat{k}$.

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33. Prove that $\int_{-2}^{2} |1 - x^2| dx = 4$

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34. Evaluate (with the help of definite integral)

$$\lim_{n \to \infty} \left[\frac{1}{\sqrt{n}} + \frac{1}{\sqrt{2n}} + \frac{1}{\sqrt{3n}} + \ldots + \frac{1}{n} \right]$$

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35. If two dice are rolled 12 times, obtain the mean and varianve of the distribution of successes, if getting a total greater than 4 is considered a success.

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36. Find the equation to the curve passing through (2,2) and having its slope $\left(-\frac{x+y}{x} \right)$ at the point (x,y)

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37. Find the area of the parallelogram whose two adjacent sides are 3i+4j and 5i+7j+2k.

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38. The foot of the perpendicular drawn from the origin 0 to a plane is N(12,-4,-3). Find the equaion of the plane in cartesian form and vector form.

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