MATHS

BOOKS - MODERN PUBLICATION

MOCK TEST-2

Exercise

1. If $\begin{vmatrix} x & x \\ 1 & x \end{vmatrix} = \begin{vmatrix} 3 & 4 \\ 1 & 2 \end{vmatrix}$. Write the positive value of 'x'.

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2. Evaluate : $\int_0^{\frac{\pi}{2}} \frac{\sin^{\frac{3}{2}} x}{\sin^{\frac{3}{2}} x + \cos^{\frac{3}{2}} x} dx.$

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3. Verify that $y = cx + \frac{a}{c}$ is a solution of: $y = x\frac{dy}{dx} + a\frac{dx}{dy}.$

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4. If a line angles $90^\circ, 135^\circ, 45^\circ$ with the positive x,y and z axis respectively, find its direction cosines.

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5. For the matrix $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$, verify that $(A + A')$ is a symmetric matrix.

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6. For the matrix $A = \begin{bmatrix} 1 & 5 \\ 6 & 7 \end{bmatrix}$, verify that $(A - A')$ is a skew symmetric matrix.

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7. Solve the following eqations, using inverse of a matrix:

$5x + 2y = 3$

$3x + 2y = 5$

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8. Differentiate $\cos^{-1}\left(\frac{1-x^2}{1+x^2}\right), 0 < x < 1$. w.r.t.x

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9. Find the equation of the normal to the curve $ay^2 = x^3 at (am^2, am^3)$

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10. Find local minimum value of the function f given by $f(x) = 3 + |x|, x \in R$

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11. Evaluate the definite integral: $\int_0^{\frac{\pi}{4}} \frac{\sin x \cos x}{\cos^4 x + \sin^4 x} dx$

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12. Solve the differential equation : $(x^2 + xy)dy = (x^2 + y^2)dx.$

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13. Find the volume of the parallelopiped whose sides are given by vectors

$2\hat{i} - 3\hat{j} + 4\hat{k},\ \hat{i} + 2\hat{j} - \hat{k}$ and $3\hat{i} - \hat{j} + 2\hat{k}.$

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14. Prove that :

$$\tan^{-1}x+\tan^{-1}2\frac{x}{1-x^2}=\tan^{-1}\left(\frac{3x-x^3}{1-3x^2}\right),\ |x|<\frac{1}{\sqrt{3}}$$

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15. Solve the following equations:

$$\tan^{-1}\left(\frac{1-x}{1+x}\right)=\frac{1}{2}\tan^{-1}x,\ x>0$$

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16. If $A=\begin{bmatrix}1&2&2\\2&1&2\\2&2&1\end{bmatrix}$, verify that : $A^2-4A-5I=O$

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17. Solve the following system of equations by matrix method, where $x \neq 0, , y \neq 0, z \neq 0$:

$$\frac{2}{x} - \frac{3}{y} + \frac{3}{z} = 10, \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 10, \frac{3}{x} - \frac{1}{y} + \frac{2}{z} = 13$$

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18. If $x \neq y \neq z$ and $\begin{vmatrix} x & x^3 & x^4 - 1 \\ y & y^3 & y^4 - 1 \\ z & z^3 & z^4 - 1 \end{vmatrix} = 0$, then prove that : $xyz(xy + yz + zx) = x + y + z$

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19. If $x^y = e^{x - y}$, then prove that $\frac{dy}{dx} = \frac{\log x}{(1 + \log x)^2}$

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20. If $y = x\log\left[(ax)^{-1} + a^{-1}\right]$, prove that : $x(x+1)\frac{d^2y}{dx^2} + x\frac{dy}{dx} = y - 1$

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21. Evaluate : $\int \frac{x^2}{(x^2+1)(3x^2+4)}dx$

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22. Evaluate : $\int_1^4 (3x^2 + 2x)dx$ as the limit of sum.

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23. Prove that : $\int_0^{\frac{\pi}{2}} \sin 2x \log \tan x dx = 0$

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24. Find the particular solution of the differential equation $(1+e^{2x})dy + (1+y^2)(e^x)dx = 0$ given that $y = 1$ when $x = 0$

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25. Using vectors, find the area of the triangle having vertices A (1, 1, 1), B (1, 2, 3) and C (2, 3, 1).

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26. Find the co-ordinates of the foot of the perpendicualr drawn from the point A(1,8,4) to the joining B(0,-1,3) and C(2,-3,-1).

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27. There are 40 scholars in a class, out of which 10 are sports- persons. Three scholars are selected at random out of them. Find the probability distribution for the selected persons who are sports-persons. Find the mean of the distribution.

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28. let $A = N \times N$ and * be the binary operation on A defined by : (a,b) * (c,d) = (a+c,b+d)`. Show that * is commutative and associative. Find the identify element for * on A, if any.

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29. Consider $r \rightarrow [4, \infty]$ given by $f(x) = x^2 + 4$. Show that f is invertible with the increase $f^{-1} o f f$ given by $f^{-1}(y) = \sqrt{y-4}$, where R is the set of all non-negative real numbers.

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30. Find the points of local maximum and local minimum, if any, of the function: $f(x) = \sin x - \cos x, \ 0 < x < 2\pi$. Also find the local maximum and local minimum values.

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31. Using integration find the area of region bounded by the triangle where vertices are : (4,1),(6,6) and (8,4)

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32. If the sum of two unit vectors is a unit vector, show that the magnitude of their difference is $\sqrt{3}$.

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33. If the line $\frac{x-1}{2}=\frac{y+1}{3}=\frac{z-1}{4}$ and $\frac{x-3}{1}=\frac{y-k}{2}=\frac{z}{1}$ intersect, then k is equal to

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34. Convert 5283 meters to kilometers.

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35. An urn contains 4 white and 3 red balls. Let 'X' be the number of red balls in a random draw of three balls. Find the mean and variance of X.

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36. For three persons A, B and C the chances of being selected as Manager of a firm are in the ratio $4:1:2$ respectively. The respective probabilities for them to introduce a radical change in marketing strategy are 0.3, 0.8 and 0.5. If the change does take place, find the probability that it is due to the appointment of B or C.

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