



## MATHS

## **BOOKS - MODERN PUBLICATION**

# **TEST PAPER 8**



**1.** Find the value of 
$$\cos \tan^{-1} \cot \left( c \circ s^{-1} \left( \sqrt{\frac{3}{2}} \right) \right).$$

2. Constuct a 2 x 3 matrix having elements given by

 $a_{ij} = ij.$ 

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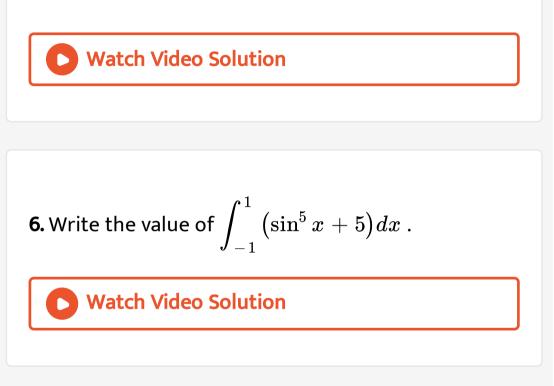
**3.** If 
$$\begin{bmatrix} 3 & 2 \\ 7 & x \end{bmatrix} \begin{bmatrix} 5 & -2 \\ -7 & y \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$
 then find the

value of x and y.

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**4.** If 
$$y=at^2$$
 and  $x=2at$  then find  $\displaystyle rac{d^2y}{dx^2}$  at  $x=\displaystyle rac{1}{2}.$ 

5. In what interval  $f(x) = \log_5 x$  is decreasing (if any) ?



7. The degree of the differential equation satisfying

$$\sqrt{1-x^2}+\sqrt{1+y^2}=a(x-y)$$
 is\_\_\_\_\_

8. Write the value of y so that the points (1,y,2),(3,2,-1)

and (-4, 6, 3) are collinear.



9. Write the equation of the plane passing through

(1,2,3) and parllel to the plane x + 2y + 5z = 0.



**10.** Let A = {1, 2, 3). Then, show that the number of relations containing (1, 2) and (2, 3) which are reflexive and transitive but not symmetric is three.

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11. Test whether the relations are reflexive, symmetric

or transitive on the sets specified.

 $R=\{(m,n):m-n \geq 7\}$  on Z.



12. Let \* be the binary operation on N given by a\*b =

LCM of a and b. Find

(i) 5\*7,20\*16

(ii) Is\* commutative?

(iii) Is \* associative?

(iv) Find the identity of\* in N.

(v) Which elements of N are invertible for the

operation ?

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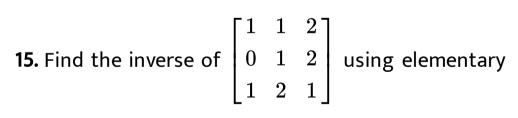
**13.** Show that f:R to R defined as f(x) = 4x + 3 is invertible. Find the inverse of 'f' .



**14.** Express 
$$A = \begin{bmatrix} x & a & b \\ a & y & c \\ b & c & z \end{bmatrix}$$
 as the sum of a

symmetric and a skew symmetric matrix.

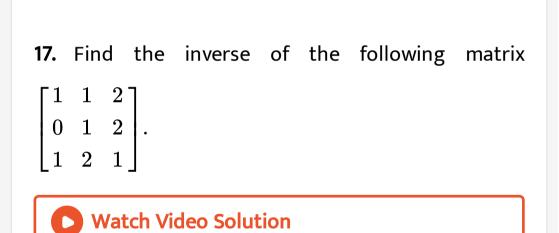




operations.

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16.



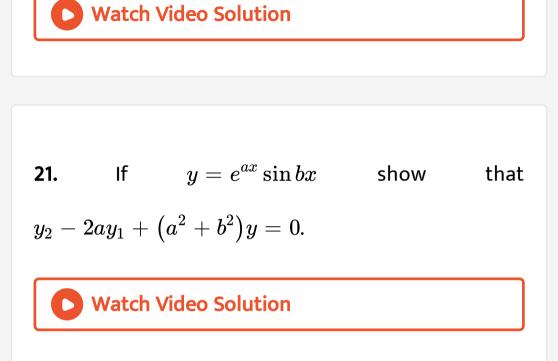
**18.** Prove that the following.  $\begin{bmatrix} a & b & c \\ x & y & z \\ p & q & r \end{bmatrix} = \begin{bmatrix} y & b & q \\ x & a & p \\ z & c & r \end{bmatrix} = \begin{bmatrix} x & y & z \\ p & q & r \\ a & b & c \end{bmatrix}$ 

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19. Examine the contiunity of the the following

functions at indicated points. f(x)= $\left\{egin{array}{ccc} rac{1}{e^{rac{1}{x}-1}} & ext{if } x>0 \ 0 & ext{if } x\leq 0 \end{array}
ight.$ at x=0

**20.** Differentiate :  $(\sec x + \tan x)^{\cot x}$ .



$$x^2e^{-x^2}\leq e^{-1}, x\in R.$$

**23.** Find the interval in which  $y = (x - 1)^2 (x + 2)$  is

(i) increasing

:

(ii) decreasing

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**24.** Evaluate : 
$$\int \! \frac{dx}{x(x^4+1)}$$

- -

25. Evaluate : 
$$\int \! \frac{dx}{\sqrt{x^2+8x}}$$

- - - -



**26.** Evaluate : 
$$\int_0^{rac{\pi}{2}} e^x \cos x dx$$
 .

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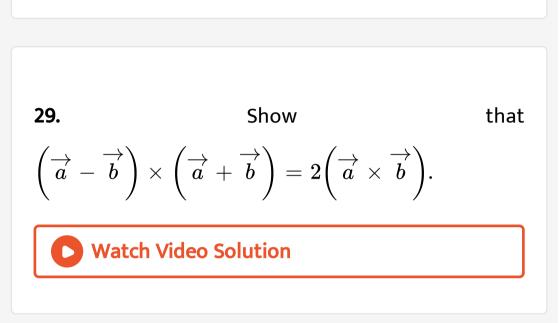
27. From the differential equation whose general solution is  $y = a \sin t + be^t$ .



**28.** Find the unit vector perpendicular to the plane ABC, where the position vectors of A, B and C are

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

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**30.** The direction cosines of a straight line in two neighbouring positions are (l,m,n)and< l + deltal,m +deltam,n + deltan>. If dtheta is a small amgle

between them then prove that -

$$\left(\delta heta
ight)^2 = \left(\delta l
ight)^2 + \left(\delta m
ight)^2 + \left(\delta m
ight)^2.$$

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**31.** Find the equation of the plane Passing through the intersection of the planes x + 3y - z + 1 = 0and 3x - y + 5z + 3 = 0 and is at a distance 2/3units from origin.

**32.** Find the equation of the straight line perpendicular to the line  $\frac{x-2}{3} = \frac{y+1}{4} = \frac{z-6}{7}$  and lyinng in the plane x - 2y + 4z - 51 = 0.

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33. Examining consistency and solvability, solve the following equations by matrix method. x + 2y + 3z = 14, 2x - y + 5z = 15, 2y + 4z - 3x = 13

34.

Prove

$$egin{bmatrix} a^3-x^3&a^2&a\ b^3-x^3&b^2&b\ c^3-x^3&c^2&c \end{bmatrix} = (a-b)(a-c)(b-c)ig(abc-x^3ig)$$

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**35.** (i) If  $x = \sin t$ ,  $y = \sin 2t$  then prove that  $(1-x^2)d^2\frac{y}{dx^2} - x\frac{dy}{dx} + 4y = 0.$ If y = gof(x) then find dy/dx.

**36.** Show that the radius of the right cicular cylinder of greatest curved surface that can be inscribed in a given cone is half the redius of the base of the cone.

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## 37. Find the solution of the differential equation

$$x\sin\Bigl(rac{y}{x}\Bigr)dy=\Bigl(y\sin\Bigl(rac{y}{x}\Bigr)-x\Bigr)dx.$$

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38. Find the area of the region included between the

parabola  $y^2=2x$  and the straight line x-y=4.

**39.** A variable plane is at a constant distance p from the origin and meets the axes at A,B,C. Through A,B,C plane are drawn parallel to the co-ordinate planes. Show that the locus of their points of intersection is

$$rac{1}{x^2} + rac{1}{y^2} + rac{1}{z^2} = rac{1}{p^2}.$$

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**40.** (i) If the vectors  $\vec{a} + \vec{b} + \vec{c} = 0 |\vec{a}| = 3$ ,  $|\vec{b}| = 5$  and  $|\vec{c}| = 7$ , find the angle between a and

(ii) If the vectors 2hat i+3hat j+4hat k and  $(a-1)\hat{i}+(b+2)\hat{j}+8\hat{k}$  are parallel then find the values of a and b.