



## MATHS

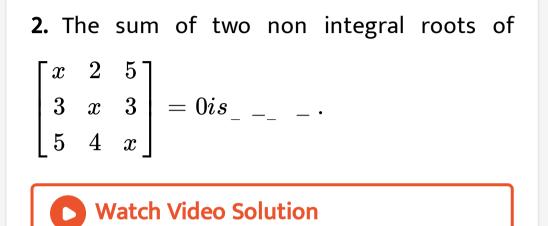
# **BOOKS - MODERN PUBLICATION**

# **TEST PAPER 5**



## 1. Find the number of equivalence relations on

$$x = \{1, 2, 3\}.$$



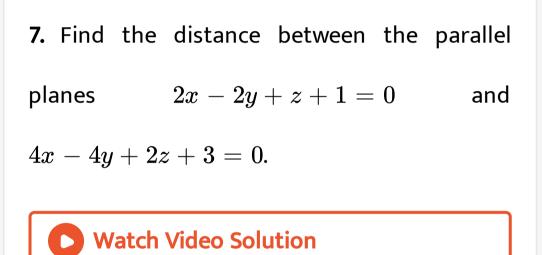
**3.** If 
$$f(x) = x^3 + e^{rac{x}{2}}$$
 and  $g(x) = f(x)$  ' then

what is the value of `g'(1)' ?

4. Write the interval in which the function  $f(x) = \sin^{-1}(2 - x)$  is differentiable. • Watch Video Solution 5. Evaluate :  $\int_{-1}^{2} x Inx' dx$ 

**6.** Name of curve which is represented by the solution of differential equation

$$2xrac{dy}{dx}-y=3$$



8. In each of the problems given below, find the work done by a force  $\overrightarrow{F}$  acting on a

particle, such that the particle is displaced from a point A to a point B.  $\overrightarrow{F} = 4\hat{i} - 3\hat{k}$ A(1,2,0), B(0,2,3).

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**9.** Show that the relation R is in the set  $A = \{1, 2, 3, 4, 5\}$  given by R={(a, b): |a-b| is divisible by 2}, is an equivalence relation. Write all the equivalence classes of R.

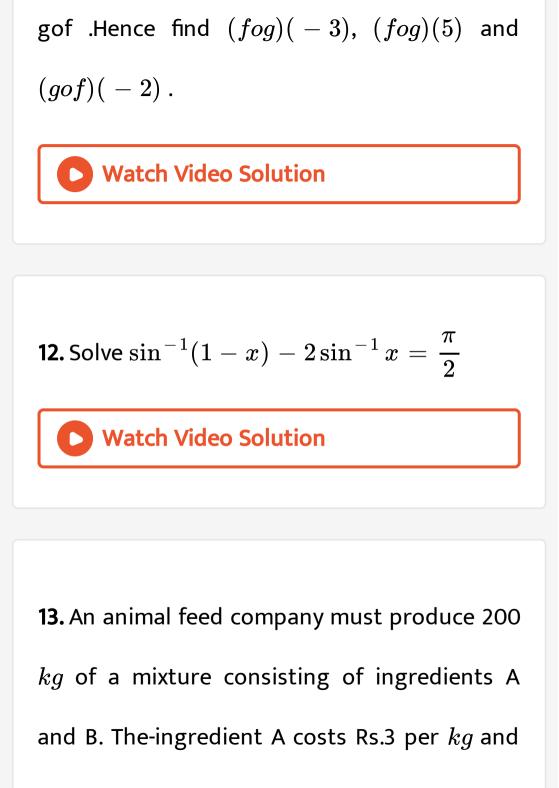
10. A binary operation \* is defined on the set

 $X=R-\{-1\}$  by  $x*y=x+y+xy,\ orall x,y\in X.$ Check whether \* is commutative and associative. Find its identity element and also find the inverse of each element of X.

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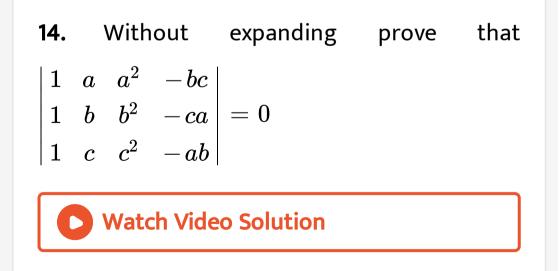
11. Let f,  $g \colon R o R$  defined by f(x) = |x| + x,

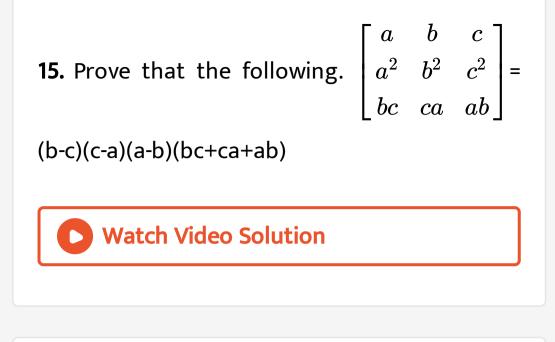
g(x) = |x| - x for all x in R then find fog and



B costs 5 per kg. No more than 80 kg of A can be uséd and at least 60 kg of B must be used. Formulate the problem to minimise thé cost of mixture.







16. Find the inverse of the following matrices

using elementary transformation:

$$\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \\ 1 & 0 & 2 \end{bmatrix}$$

**17.** If 
$$A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$$
 "show that"  
 $A^3 - 23A - 40I = 0$ 

## 18. Express as a sum of a symmetric and a skew

symmetric matrix:

$$egin{bmatrix} 2 & -1 & 3 \ 5 & 7 & -2 \ 1 & 4 & 6 \end{bmatrix}$$

19. If 
$$y = In(x^2 + y^2)$$
, then find  $\frac{dy}{dx}$ . **Vatch Video Solution**

**20.** If 
$$x=a\cos^3\theta$$
,  $y=a\sin^3\theta$ , then find  $\frac{d^2y}{dx^2}$ 

**21.** Find the equation of the normal to the curve 
$$y = \left(\log x\right)^2$$
 at  $x = \frac{1}{e}$ .

**22.** Determine the interval in which the function  $f(x) = x^3 - 5x^2 + 3x + 97$  is decreasing and that in which it is increasing.

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23. Find the tangent to the curve  $y = \cos(x + y), 0 \le x \le 2\pi$  which is parallel to the line x + 2y = 0

**24.** Evaluate 
$$\int_0^2 \left|x^2+2x-3
ight|dx$$

**25.** solve:
$$ydx - xdy = xydx$$

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26. 
$$\int \frac{xe^x}{1+x^2} dx$$

27. 
$$\int_0^{\pi} \frac{x dx}{1 + \sin x}$$
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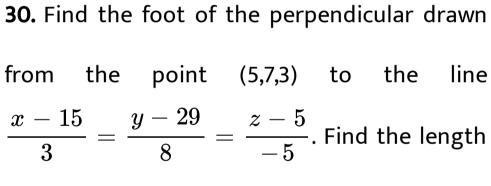
28. Solve : 
$$ig(x+2y^3ig)rac{dy}{dx}=y.$$

29. If the position vectors of the points A, B, C are 
$$2\hat{i}+\hat{j}-\hat{k},3\hat{i}-2\hat{j}+\hat{k}$$
 and  $\hat{i}+4\hat{j}-3\hat{k}$ 

respectively, then prove that A, B, C are

collinear.





of the perpendicular.

**31.** Passing through the point (2, -3, 1) and

(-1, 1-7) and perpendicular to the plane

$$x - 2y + 5z + 1 = 0.$$



32. Find the direction cosines of the line which

is perpendicular to the lines whose direction

ratios are <1,-2,3> and <2,2,1>.



**33.** Show that the shrtest distance of the point

(0, 8a) from the curve  $ax^2=y^3$  is  $2a\sqrt{11}.$ 

34. If 
$$egin{bmatrix} x & x^2 & x^3-1 \ y & y^2 & y^3-1 \ z & z^2 & z^3-1 \end{bmatrix} = 0$$

then prove that xyz=1 when x,y,z are non zero

and unequal.

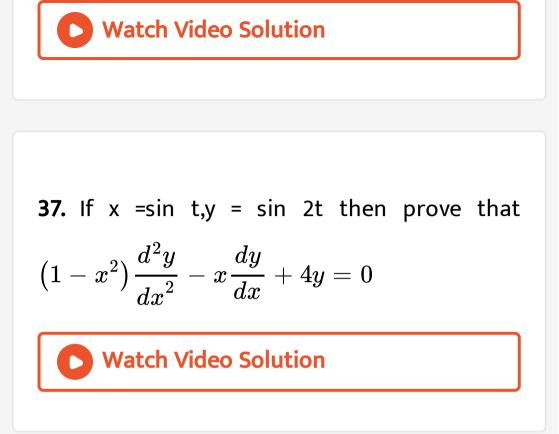
35. Examining consistency and solvability, solve the following equations by matrix method. x + 2y + 3z = 14, 2x - y + 5z = 15, 2y + 4z - 3x = 13

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### **36.** Prove the following:

 $egin{aligned} ax-by-cz & ay+bx & az+cx\ bx+ay & by-cz-ax & bz+cy\ cx+az & ay+bz & cz-ax-by \end{aligned}$ 

 $ig(a^2+b^2+c^2ig)(ax+by+cz)ig(x^2+y^2+z^2ig)$ 



**38.** Show that the semi-vertical angle of a right circular cone of minimum volume that circumscribes a given sphere is  $\sin^{-1}\left(\frac{1}{3}\right)$ .

**39.** 
$$\int_0^{\pi} \left( \frac{\tan x}{\sin x + \tan x} \right) dx$$
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**40.** Find the area of the regions into which the circle  $x^2 + y^2 = 4$  is divided by the line  $x + \sqrt{3}y = 2$ .

