



# MATHS

# **BOOKS - SHARAM PUBLICATION**

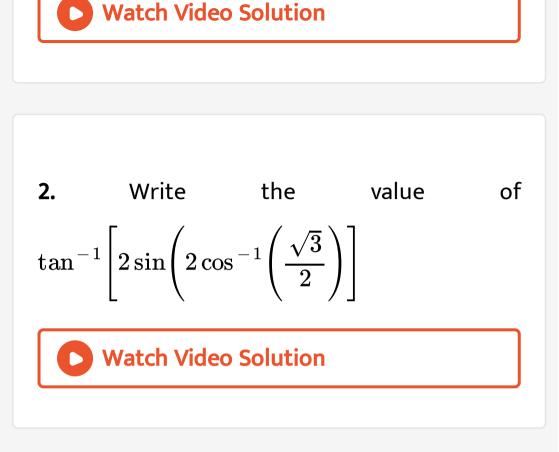
# **MODEL QUESTION PAPER 12**



1. Let R is the equivalence in the set A = {0, 1, 2,

3, 4, 5} given by R = {(a, b) : 2 divides (a - b)}.

Write the equivalence class [0].

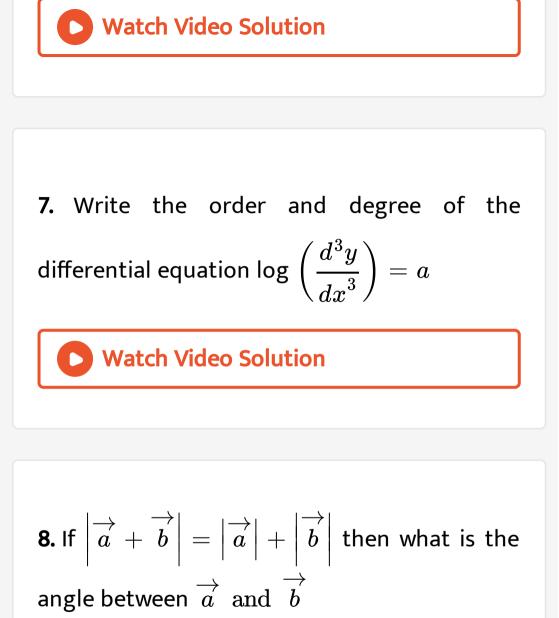


**3.** Solve the following matrix equation for x  $\begin{bmatrix} x & 1 \end{bmatrix} \begin{bmatrix} 1 & 0 \\ -2 & 0 \end{bmatrix} = 0.$ 

**4.** If every element of a third order determinant of value 8 is multiplied by 2, then write the value of the new determinant.

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5. If 
$$y = \tan^{-1} \sqrt{\frac{1 - \cos x}{1 + \cos x}}$$
, then find  $\frac{dy}{dx}$   
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**6.** Evaluate  $\int \log x dx$ 



9. Write the angle between the planes 3x -5y +

2z-8 = 0 and 2x + 4y + 7z + 16 = 0.



10. Show that the relation R defined on the set

Z of all integers defined as R={(x,y):x-y is an

integer} is reflexive, symmertric and transtive.



**11.** Let f(x) = $\sqrt{x}$ ,  $g(x) = 1 - x^2$ . Compute fog and gof .

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12. Consider the binary operation \* on the set {1, 2, 3, 4 5} defined by a \* b = min (a, b).
Write operation table of operation \* .

$$\cos an^{-1} \sin \cot^{-1} x = \sqrt{rac{1+x^2}{2+x^2}}.$$

that

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**14.** Solve the LPP Maximize z=3x+2y

Subject to  $x+y \leq 400$ 

 $2x+y\leq 500, x\geq 0, y\geq 0$ 

**15.** If the matrix A is such that  $\begin{bmatrix} 1 & -1 \\ 2 & 3 \end{bmatrix} A = \begin{bmatrix} -4 & 1 \\ 7 & 7 \end{bmatrix}$ , find A.

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16. Verify that 
$$A = egin{bmatrix} a & b \ c & d \end{bmatrix}$$

 $A^2-(a+d)A+(ad-bc)I=0$  where I is

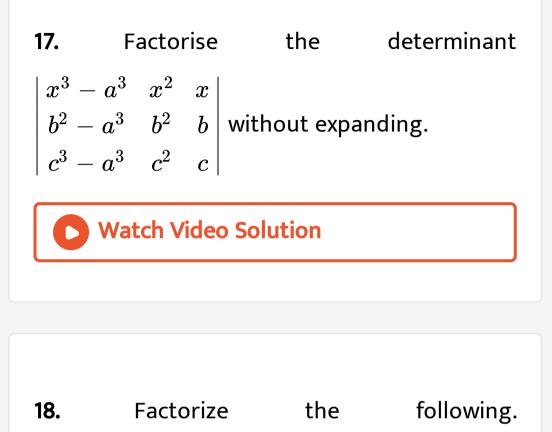
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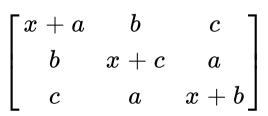
equation

the 2x2 unit matrix.

satisfies







**19.** If 
$$A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$$
 then prove that  $A^2 - 5A + 7I = O$ 

20. Find the value of k if the function f(x) defined by f(x)=  $\begin{cases} 2x-1 & whenx < 2 \\ k & whenx = 2 \\ x+1 & whenx > 2 \end{cases}$  is

continous at x=2.

**21.** If sin  $y = x \sin (a + y)$  then show that  $rac{dy}{dx} = rac{\sin^2(a+y)}{\sin a}$ dxWatch Video Solution 22. If  $y^2 \cot x = x^2$  coty then find  $rac{dy}{dx}$ Watch Video Solution

**23.** Find the intervals where function is increasing function y = cos x + sin x,x  $\varepsilon[0, 2\pi]$ 



#### 24. Find the equation of the normal to the

curve

$$5x^2+3y^2=23$$
 at (2,-1)

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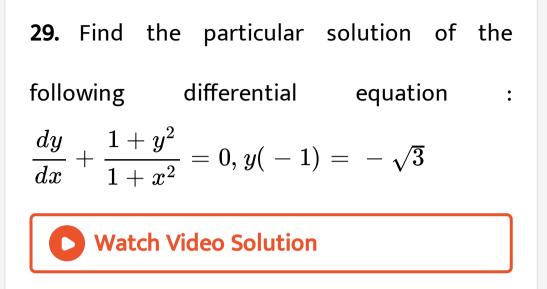
25. Integrate 
$$\int \sec x \tan x \cdot \sqrt{\tan^2 x - 3} \cdot dx$$

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

27. Evaluate 
$$\int_0^1 \left[ an^{-1} x + rac{x}{1+x^2} 
ight] dx$$

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28. Find the area of region enclosed by  $y^2 = 4ax$  and  $x^2 = 4ay$ .



#### **30.** If the sum of two unit vectors is a unit

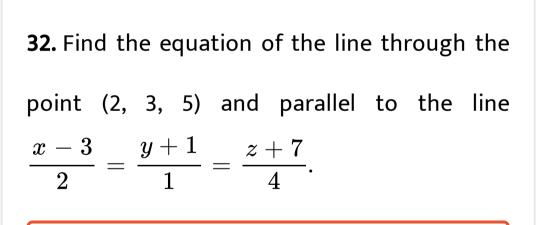
vectors find the magnitude of their difference.

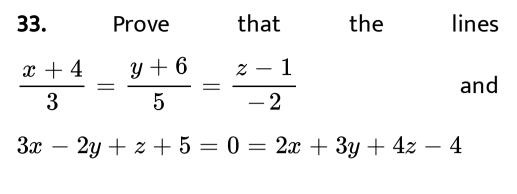


**31.** If  $\hat{i}+\hat{j}+\hat{k}$  and  $2\hat{i}-lpha\hat{j}+3\hat{k}$  are

orthogonal to each other then find lpha







are co-planar.

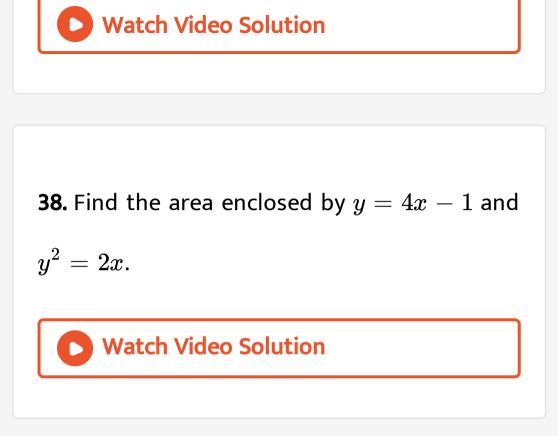
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**34.** Solve : 
$$\tan^{-1} x + \tan^{-1} \left( \frac{2x}{1-x^2} \right) = \frac{\pi}{2}$$

35. If 
$$y = x^{\sin x - \cos x} + rac{x^2 - 1}{x^2 + 1}$$
, then find  $rac{dy}{dx}$ 

**36.** Find the equation of the tangent to the curve  $y = x^4 - 6x^3 + 13x^2 - 10x + 2$  at the point x=1 and y=0.

37. Find 
$$\int x^2 (\sin^4 x + \cos^4 x) dx$$



**39.** Find the solution of the following differential equations:  $\sqrt{2}$ 

$$xdy-ydx=\sqrt{x^2+y^2dx}$$

**40.** For 
$$\overrightarrow{a} = \hat{i} + \hat{j}$$
,  $\overrightarrow{b} = -\hat{i} + 2\hat{k}$ ,  $\overrightarrow{c} = \hat{j} + \hat{k}$ ,  
obtain  $\overrightarrow{a} \times \left(\overrightarrow{b} \times \overrightarrow{c}\right)$  and also verify the  
formula  $\overrightarrow{a} \times \left(\overrightarrow{b} \times \overrightarrow{c}\right) = \left(\overrightarrow{b} \times \overrightarrow{c}\right) = \left(\overrightarrow{a} \cdot \overrightarrow{c}\right)\overrightarrow{b} - \left(\overrightarrow{a} \cdot \overrightarrow{b}\right)\overrightarrow{c}$ .

**41.** Prove that the measure of the angle between two main diagonals of a cube is  $\cos^{-1}\frac{1}{3}$ .



