



# MATHS

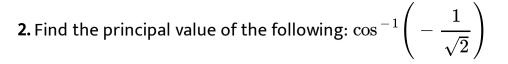
# BOOKS - JEEVITH PUBLICATIONS MATHS (KANNADA ENGLISH)

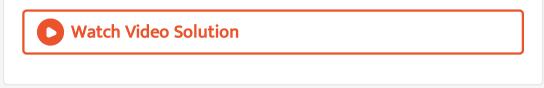
# **MODEL QUESTION PAPER 2**

#### Part A

1. Give an example of a relation which is symmetric but neither

reflexive nor transitive.





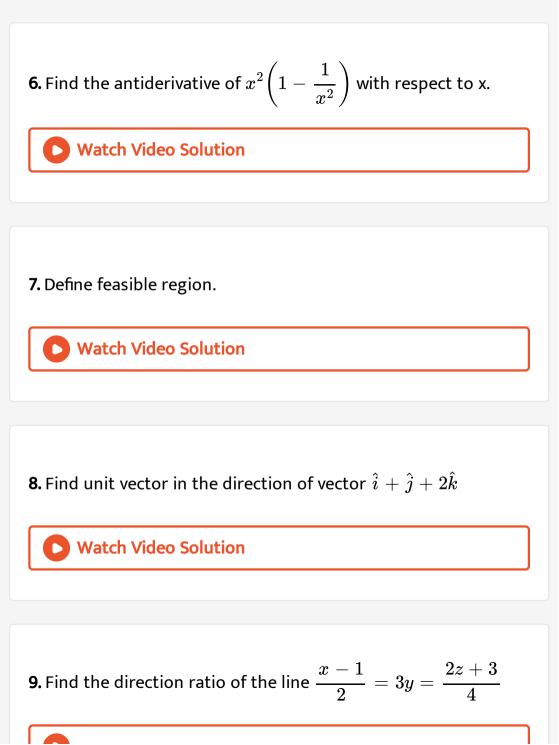
**3.** Construct a 2 imes 2 matrix  $A=\left|a_{ij}
ight|$  whose elements are given

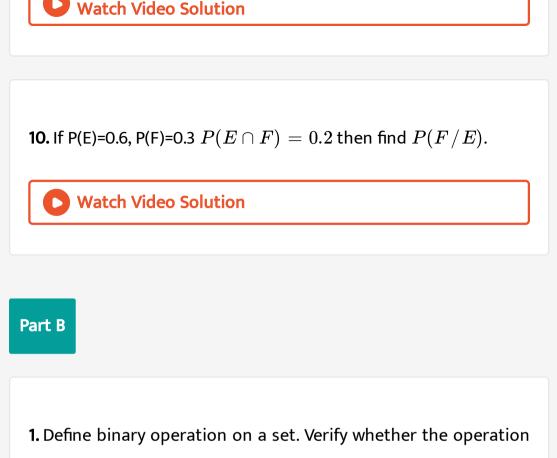
by  $a_{ij} = 2i + j$ .

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**4.** If 
$$A = egin{bmatrix} 2 & 3 \ -1 & 2 \end{bmatrix}$$
, find |2A|.

5. If 
$$y = e^{3\log x}$$
, then show that  $rac{dy}{dx} = 3x^2$ 





\* defined on Z by a\* b=ab+1 is binary or not

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**2.** Write 
$$\cot^{-1}\left(rac{1}{\sqrt{x^2-1}}
ight), x>1$$
, in the simplest form.

**3.** find the equation of line joining (1,2) and (3,6) using determinants

**4.** Prove the following:

$$\sin^{-1}\Bigl(2x\sqrt{1-x^2}\Bigr) = 2\sin^{-1}x, \; -rac{1}{\sqrt{2}} \leq x \leq rac{1}{\sqrt{2}}$$

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$$\mathbf{5.}\,y= an^{-1}igg(rac{3x-x^3}{1-3x^2}igg),\,rac{1}{\sqrt{3}},\,x,rac{1}{\sqrt{3}}.$$

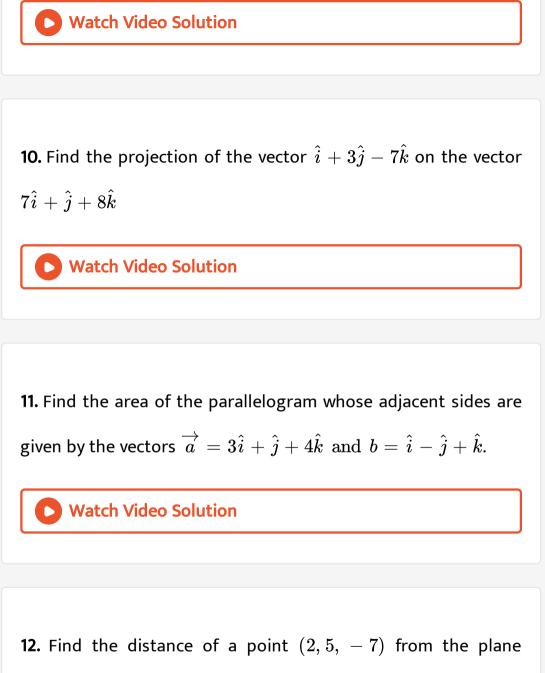
**6.** Find 
$$rac{dy}{dx}$$
 if  $\sin^2 x + \cos^2 y = k$ , where k is constant.

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**7.** If the radius of a sphere is measured as 7m with an error of 0.02 m, then find the approximate error in calculating its volume.

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**8.** Evaluate: 
$$\int rac{\cos 2x}{\left(\sin x + \cos x
ight)^2} dx$$



$$\overrightarrow{r}.\left(6\hat{i}-3\hat{j}+2\hat{k}
ight)=4$$

13. Find the order and the degree of the differential equation

$$rac{d^3y}{dx^2}+rac{d^2y}{dx^2}+rac{dy}{dx}=0$$

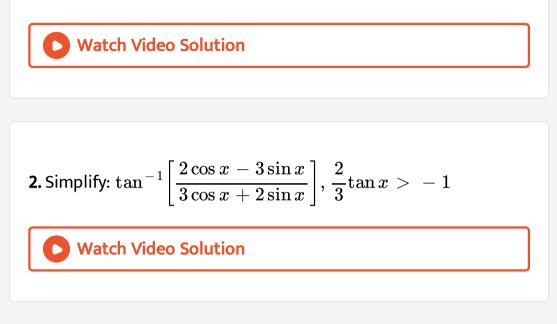
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**14.** Given that the event A and B are such that P (A)= $\frac{1}{2}$ ,  $P(A \cap B) = \frac{3}{7}$  and P(B)=K find k if A and B are independent.



1. Show that the relation R in the set of all integers Z defined by

R{(a,b) : 2 divides a-b} is an equivalence relation.



**3.** Express matrix A= 
$$\begin{bmatrix} 1 & 2 \\ 2 & -1 \end{bmatrix}$$

as the sum a symmetric and skew symmetric matrix.

**4.** If a function f(x) is differentiable at x = c prove that it is continuous at x = c. Watch Video Solution 5. Verify Rolle's theorem for the function  $f(x) = x^2 - 4x - 3$ , in the interval [1,4]. Watch Video Solution 6. Find the equation of tangent to the curve given by

$$x=a\sin^3t, y=b\cos^3t$$
 a point where  $t=rac{\pi}{2}$ 

7. Evaluate : 
$$\int rac{x+2}{2x^2+6x+5} dx$$

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**8.** Evaluate : 
$$\int e^{x} \left( \frac{1 + \sin x}{1 + \cos x} \right) dx$$

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**9.** Find the area hounded by parabola  $y^2 = 4x$  and the line y = 2x

10. Three vectors  $\bar{a}, \bar{b}$  and  $\bar{c}$  satisfy the condition  $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} = \overrightarrow{0}$ 

#### evaluate

$$\mu = \overrightarrow{a} \cdot \overrightarrow{b} + \overrightarrow{b} \cdot \overrightarrow{c} + \overrightarrow{c} \cdot \overrightarrow{a} ext{ if } \left| \overrightarrow{a} \right| = 1, \left| \overrightarrow{b} \right| = 4 ext{ and } \left| \overrightarrow{c} \right| = 2$$

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11. Find the shortest distance betweenn the lines.

$$ec{r} = \hat{i} + \hat{j} + \lambda \Big( 2 \hat{i} - \hat{j} + \hat{k} \Big) 
onumber \ ec{r} = 2 \hat{i} + \hat{j} - \hat{k} + \mu \Big( 3 \hat{i} - 5 \hat{j} + 2 \hat{k} \Big).$$

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**12.** Form the differential equation of circles touching the x-axis at origin:

**13.** An insurance company insured 2000 scooter drivers, 4000 car drivers and 6000 truck drivers. The probability of an accident is 0.01, 0.03 and 0.15 respectively. One of the insured person meets with an accident. What is the probability that he is a cooter driver?



#### Part D

1. Let  $f \colon N o R$  be defined by  $f(x) = 4x^2 + 12x + 15$ , show

that  $f: N \rightarrow S$ , where S is the range of f, is invertible. Also find the inverse.



2. Verify 
$$(B+C)A = BC + CA$$
, if  $A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix}$ ,  $B = \begin{bmatrix} 3 & 8 \\ 11 & 21 \end{bmatrix}$   
and  $C = \begin{bmatrix} 7 & 13 \\ 5 & 19 \end{bmatrix}$ 

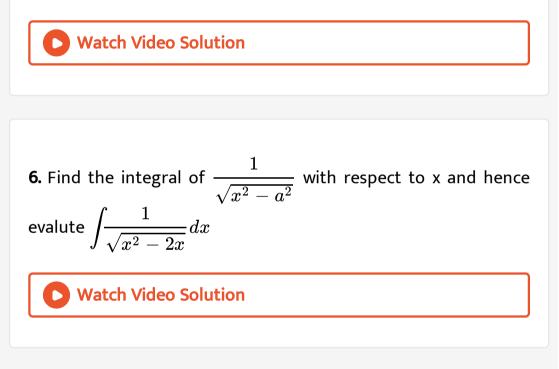
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## 3. Solve the following system of equations by matrix method.

$$x+y+3z=10, x-y-z=-2, 2x+3y+4z=4$$

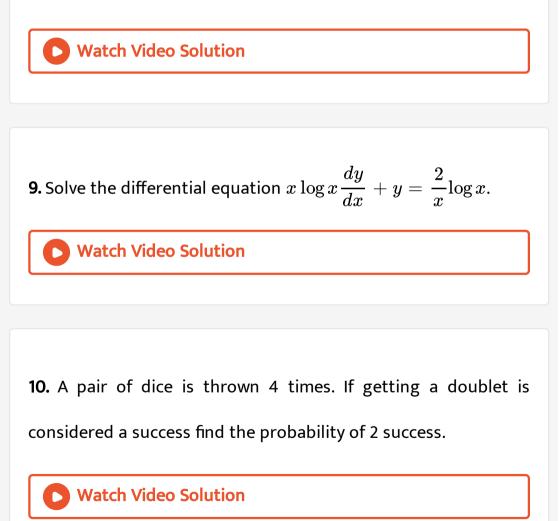
4. If 
$$y = Ae^{mx} + Be^{nx}$$
, prove that  
 $\frac{d^2y}{dx^2} - (m+n)\frac{dy}{dx} + mny = 0.$   
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**5.** A ladder 5 m long is leaning against a well. The bottom of the ladder is pulled along the ground, away from the well, at the rate of 2 m/s. How fat is its height on the wall decreasing when the foot of the ladder is 4m away from the wall?



7. Using integration, find the area bounded by the circle  $x^2+y^2=16$  and the parabola  $y^2=6x$ 

**8.** Derive the equation of a line in space passing through a given pont and parallel to a given vector in both vector and Cartesian form.



**1.** One king of cake requires 200 g of flour and 25 g of fat another kind of cake requires 100 g of flour and 50 g of fat . Find the maximum number of cakes which can be made from 5 kg of flour and 1 kg of fat assuming that there is no shortage of the other ingredients used in making the cakes.

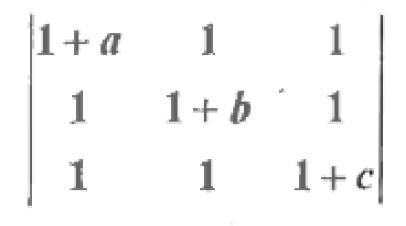
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2. Prove that 
$$\int_{-a}^{a} dx = \begin{cases} 2\int_{0}^{a} f(x)dx & ext{if } f(x) ext{is even} \\ 0 & ext{if } f(x) ext{is odd} \end{cases}$$
 and

hence evaluate

(d) 
$$\int_{-\pi/2}^{\pi/2} \tan^9 x dx.$$

#### 3. Prove that



= ab + bc + ca + abc