

# MATHS

## **BOOKS - SUNSTAR MATHS (KANNADA ENGLISH)**

# II PUC MATHEMATICS P.U. BOARD LATEST MODEL QUESTION PAPER - 1

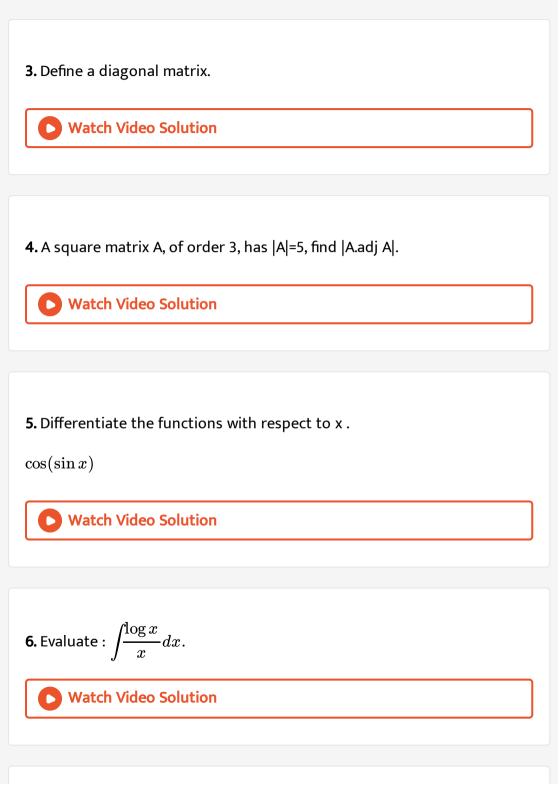


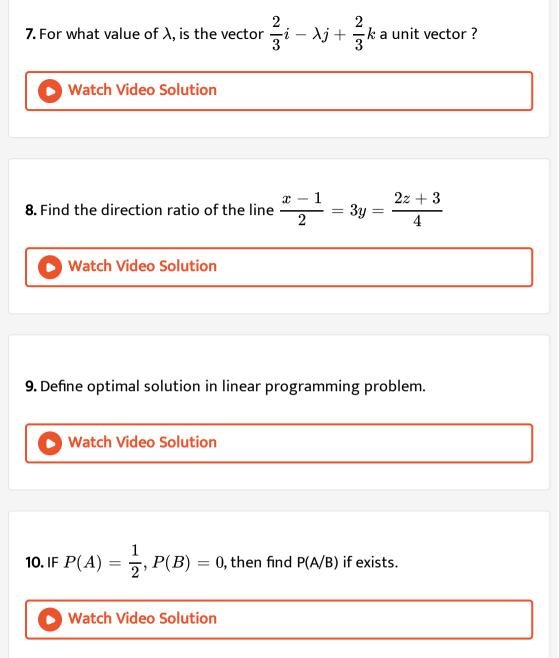
1. A relation R on A  $\ = \{1,2,3\}$  defined by  $R = \{(1,1),(1,2),(3,3)\}$  is

not symmetric. Why?

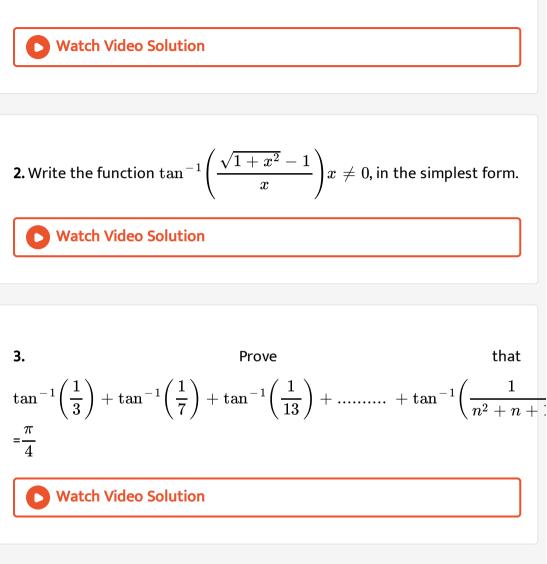


**2.** Write the principal value branch of  $f(x) = \sin^{-1} x$ .





1. Find the gof and fog if f(x) =  $8x^3$  and  $g(x) = x^{rac{1}{3}}$ 



**4.** If area of the triangle with vertices (-2, 0), (0, 4) and (0, k) is 4 square

units, find the value of 'k' using determinants.

5. Find 
$$rac{dy}{dx}$$
, if  $y+\sin y=\cos x, \ \ ext{where} \ \ y
eq(2n+1)\pi$ 

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**6.** If 
$$x = 2at, y = \frac{4}{t}$$
. Find  $\frac{dy}{dx}$ 

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7. Show that the function f given by  $f(x) = x^3 - 6x^2 + 17x - 420$  is strictly increasing on R.

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8. Find 
$$\int e^x \sec x (1 + \tan x) dx$$

9. Evaluate : 
$$\int \frac{dx}{\sin^2 \cos^2 x}$$
  
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10. Find the order and degree of the differential equation  
 $\frac{d^2y}{dx^2} = \cos 3x + \sin 3x$   
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11. The position vectors of two points P and Q are

 $\hat{i} + 2\hat{j} - \hat{k}$  and  $-\hat{i} + \hat{j} + \hat{k}$  respectively. Find the position vector of a point R which divides the line  $\overline{PQ}$  in the ratio 2 : 1 internally.

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12. If 
$$\overrightarrow{a}$$
,  $\overrightarrow{b}$  and  $\overrightarrow{c}$  are unit vectors such that  $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} = 0$ , then  
 $3\overrightarrow{a}$ .  $\overrightarrow{b} + 2\overrightarrow{b}$ .  $\overrightarrow{c} + \overrightarrow{c}$ .  $\overrightarrow{a} =$ 

13. Find the angle between the pair of lines

$$\overrightarrow{r}=3\hat{i}+5\hat{j}-\hat{k}+\lambda\Big(\hat{i}+\hat{j}+\hat{k}\Big) ~~ ext{and}~~ec{r}=7\hat{i}+4\hat{k}+\mu\Big(2\hat{i}+2\hat{j}+2\hat{k}$$

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14.

$$P(E_1) = 1/2, P(E_2) = 1/2$$
 and  $P(A/E_1) = 1/2, P\left(\frac{A}{E_2}\right) = 1/4.$   
Find  $P(E_1/A)$ .

If

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#### Part C

1. Consider the binary opertions  $*: R \times R \to R$  and  $o: R \times R \to R$ defined as a \* b = |a - b| and  $aob = a, \forall a, b \in R$ . Show that \* is commutative but not associative, o is associative but not commutative. Further, show that  $\forall a, b, c \in R, a * (boc) = (a * b)o(a * c)$ . [If it is so, we say that the opertion \* distributes over the opertion 0]. Does o distribute over \* ? Justify your answer.



**2.** Prove that 
$$\cos^{-1} \frac{4}{5} + \cos^{-1} \frac{12}{13} = \cos^{-1} \frac{33}{65}$$

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**3.** Express 
$$\begin{bmatrix} 1 & 5 \\ -1 & 2 \end{bmatrix}$$
 as the sum of symmetric and skew symmetric

matrices.

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**4.** If 
$$y = \sin^{-1} \left( \frac{2^{x+1}}{1+4^x} \right)$$
, find  $\frac{dy}{dx}$ 

5. If 
$$y = x^x + x^a + a^x + a^a$$
, find  $\frac{dy}{dx}$ 



**6.** Find two positive numbers x and y such that x + y = 60 and  $xy^3$  is

maximum.

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7. Evaluate 
$$\int \! rac{e^x(1+x)}{\cos^2(xe^x)} dx$$

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**8.** Evaluate 
$$\int_2^3 x^2 dx$$
 as the limit of sum.

**9.** Find the area between the curves y = x and  $y = x^2$ .



10. For the differential equation  $xy \frac{dy}{dx} = (x+2)(y+2)$ , find the

solution curve passing through the point (1, -1).

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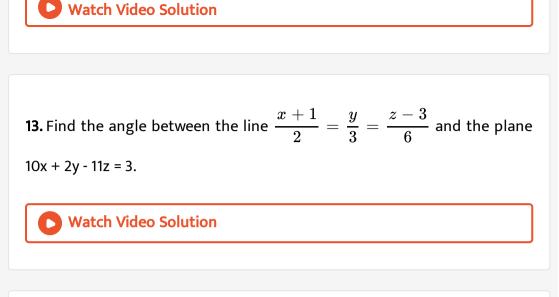
11. Find the unit vector perpendicular to each of the vectors

$$\stackrel{
ightarrow}{a}+\stackrel{
ightarrow}{b} \;\; ext{and}\;\;\stackrel{
ightarrow}{a}-\stackrel{
ightarrow}{b}\;\; ext{where}\;\;\stackrel{
ightarrow}{a}=3\hat{i}+2\hat{j}+2\hat{k}\;\; ext{and}\;\;\stackrel{
ightarrow}{b}=\hat{i}+2\hat{j}-2\hat{k}$$

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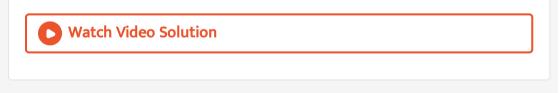
**12.** If  $\overrightarrow{a}$ ,  $\overrightarrow{b}$  and  $\overrightarrow{c}$  are three unit vectors such that  $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} = \overrightarrow{O}$ , find the value of  $\overrightarrow{a}$ .  $\overrightarrow{b} + \overrightarrow{b}$ .  $\overrightarrow{c} + \overrightarrow{c}$ .  $\overrightarrow{a}$ .





14. Two dice are thrown simultaneously. If X denotes the number of sixes.

Find the mean (expectation) of X.



#### Part D

1. If R, is the set of all non - negative real numbers prove that the function

 $f\!:\!R_+ o [\,-5,\infty]\,\,\,{
m defined}\,\,{
m by}\,\,\,f(x)=9x^2+6x-5\,\,\,\,{
m is}\,\,\,\,{
m invertible}.$  Write also  $f^{\,-1}(x).$ 

2. If 
$$A = egin{bmatrix} 0 \\ 1 \\ 2 \end{bmatrix}, B = egin{bmatrix} 1 & 5 & 7 \end{bmatrix}$$
 Verify that  $(AB)^1 = B^1A^1.$ 

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3. Solve the following system of equation by using matrix method :

x + y + z = 6, y + 3z - 11 = 0 and x + z = 2y.

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**4.** If 
$$e^y(x+1)=1.$$
 Show that  $\displaystyle rac{d^2y}{dx^2}=\left(rac{dy}{dx}
ight)^2$ 

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5. The volume of a cube is increasing at a rate of 9cc/sec. How fast is the

surface area increasing when the length of an edge is 10 cm.

6. Find the integral of  $\frac{1}{\sqrt{x^2-a^2}}$  with respect to x and hence evaluate  $\int \frac{1}{\sqrt{4x^2-25}} dx$ .

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7. Find the area bounded by the curve  $x^2 = 4y$  and the line x = 4y - 2.

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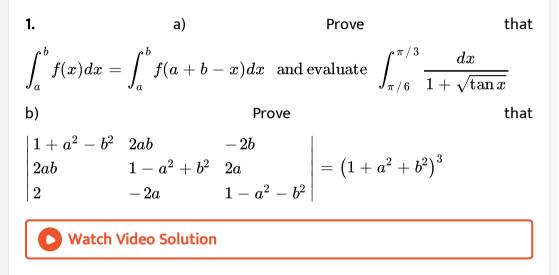
**8.** Solve the differential equation 
$$x \frac{dy}{dx} + 2y = x \log x$$
.

9. If a fair coin is tossed 6 times. Find the probability of (i) at least five

heads and (ii) exactly 5 heads.

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#### Part E



2. a) Solve the following linear programming problem graphically : Minimize and maximize Z = x + 2y, subject to constraints

 $x+2y \geq 100, 2x-y \leq 0, 2x+y \leq 200, x, y \geq 0.$