

## MATHS

# **BOOKS - USHA MATHS (ODIA ENGLISH)**

## **PREVIOUS YEAR QUESTION 2019**

**Previous Year Question** 

**1.** If veca=vecb+vecc, then write the value of  $\overrightarrow{a} \cdot \left(\overrightarrow{b} \times \overrightarrow{c}\right)$ .

2. Write the value of k such that the line  $\frac{x-4}{1} = \frac{y-2}{1} = \frac{z-k}{2}$  lies on the plane 2x - 4y + z = 7

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**3.** A R is a relation on set A such that  $R = R^{-1}$ , then

write the type of the relation R.

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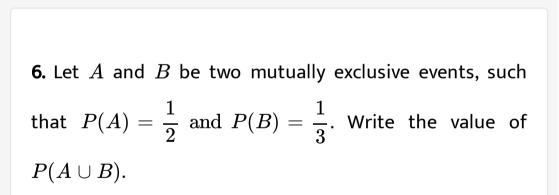
• Watch Video Solution 4. Write the value of  $\cos^{-1} \cos\left(\frac{3\pi}{2}\right)$ .  $egin{array}{cccc} 1+x & x & x^2 \ x & 1+x & x^2 \ x^2 & x & 1+x \end{array} = a+bx+cx^2+dx^3+ex^4+fx^5$ 

IF

then write the value of a.

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5.



7. If 
$$f'(2^+) = 0$$
 and  $f'(2^-) = 0$ , then is  $f(x)$   
continuous at  $x = 2$ ?  
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8. If f is an odd function, then write the value of  
 $\int_{-a}^{a} \frac{f(\sin x)}{f(\cos x) + f(\sin^2 x)} dx$   
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9. Write the order of the differential equaiton whose solution is given by  $y=(c_1+c_2){
m cos}(x+c_3)+c_4e^{x+c_5}$ 

**10.** Let R be the relation on the set R of real numbers such that aRb iff a-b is and integer. Test whether R is an equivalence relation. If so find the equivalence class of  $1 \text{ and } \frac{1}{2}$  wrt. This equivalence relation.

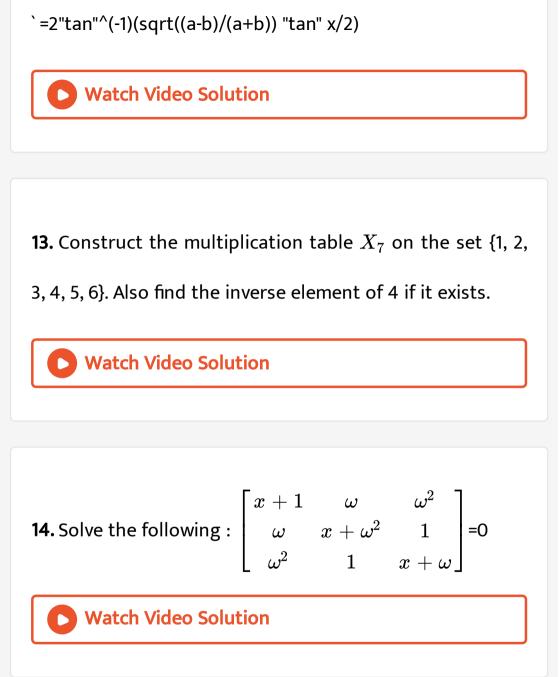


11. Solve for 
$$x, 2 \tan^{-1}(\cos x) = \tan^{-1}(2 \operatorname{cosec} x)$$
.

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12. Prove that :

$$\cos^{-1}\left(rac{b+a\cos x}{a+b\cos x}
ight)$$



**15.** A person takes 4 tests in succession. The probability of his passing the first test is p, that of his passing each succeeding test is p or  $\frac{p}{2}$  depending on his passing or failing the preceding test, Find the probability of his passing

just three tests.

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16. Find the probability distribution of

number of heads in three tosses of a coin.

**17.** If  $A = \begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 3 \\ -2 & 5 & 3 \end{bmatrix}$ , then verify that A + A' is

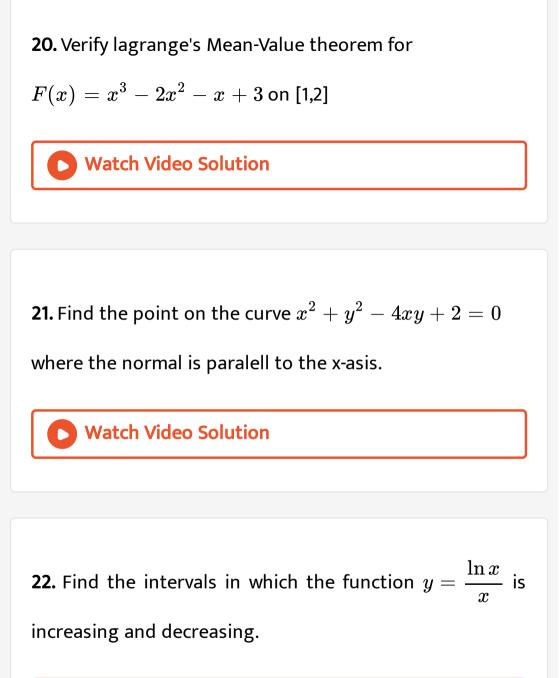
symmetric and A - A' is skew-symmetric.

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

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19. Find 
$$rac{d^2 y}{dx^2}$$
 if x=a  $\cos heta, y=b \sin heta.$ 



23. If 
$$y = e^{x^{e^{x^{e^x}}}}$$
, then find  $\frac{dy}{dx}$ .  
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24. Evaluate : 
$$\int_{0}^{\pi/2} \frac{\cos x dx}{(2 - \sin x)(3 + \sin x)}$$
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25. Find the area of the region bounded by the curve

 $y = 6x - x^2$  and the x-axis.

26. Find differential equation of the curve
$$y = ae^{3x} + be^{5x}.$$

**27.** Obtain the general solution of the following differential equations.

$$ig(x^2+7x+12ig) dy + ig(y^2-6y+5ig) dx = 0$$

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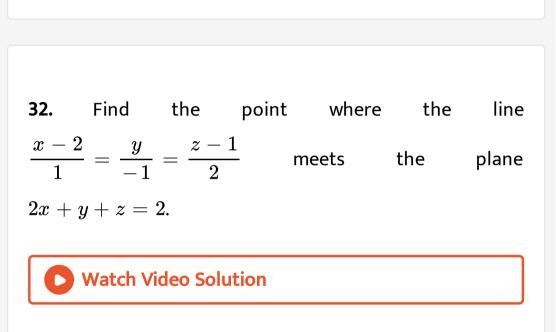
**28.** Integrate the following 
$$\int \Biggl[ rac{2x+1}{\sqrt{x^2+10x+29}} \Biggr] dx$$

29. Show that 
$$(\overrightarrow{a} \times \overrightarrow{b})^2 = a^2b^2 - (\overrightarrow{a} \cdot \overrightarrow{b})^2$$
.  
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30. Find the equation of a plane which is at a distance 3  
units from the origin and which is normal to the vector  
 $2\hat{i} + 3\hat{j} - 6\hat{k}$ .  
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**31.** If  $l_1, m_1, n_1$  and  $l_2, m_2, n_2$  are the direction cosines of two mutually perpendicular lines show that the d.cs. Of the line perpendicular to both of them are

 $m_1n_2-n_1m_2,\,n_1l_2-l_1n_2,\,l_1m_2-m_1l_2$ 

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**33.** Find the unit vector in the direction of the vector  $\vec{r}_1 - \vec{r}_2$ , where  $\vec{r}_1 = \hat{i} + 2\hat{j} + \hat{k}$  and  $\vec{r}_2 = 3\hat{i} + \hat{j} - 5\hat{k}$ 

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**34.** Find the inverse of the following matrices using elementary transformation:

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

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**35.** Out of the adult population in a village 50% are farmers, 30% do business and 20% are service holders. It is known that 10% of the farmers, 20% of the business holders and 50% of service holders are above poverty line. What is the probability that a member chosen from any one of the adult population, selected at

random, is above poverty line?

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**36.** Examining consistency and solvability, solve the following equation by matrix method.

x-2y=3

3x+4y-z=-2

5x-3z=-1



37. Show that the shrtest distance of the point (0, 8a)

from the curve  $ax^2 = y^3$  is  $2a\sqrt{11}$ .

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**38.** If 
$$e^{y/x} = \frac{x}{a+bx}$$
 then show that  
 $x^3 \frac{d}{dx} \left( \frac{dy}{dx} \right) = \left( x \frac{dy}{dx} - y \right)^2$   
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**39.** Evaluate the following integrals  $\int \frac{dx}{2\cos^2 x + 3\cos x}$ 

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**40.** Solve 
$$y^2 + x^2 rac{dy}{dx} = xy rac{dy}{dx}.$$

**41.** Determine the area common to the parabola  $y^2 = x$ 

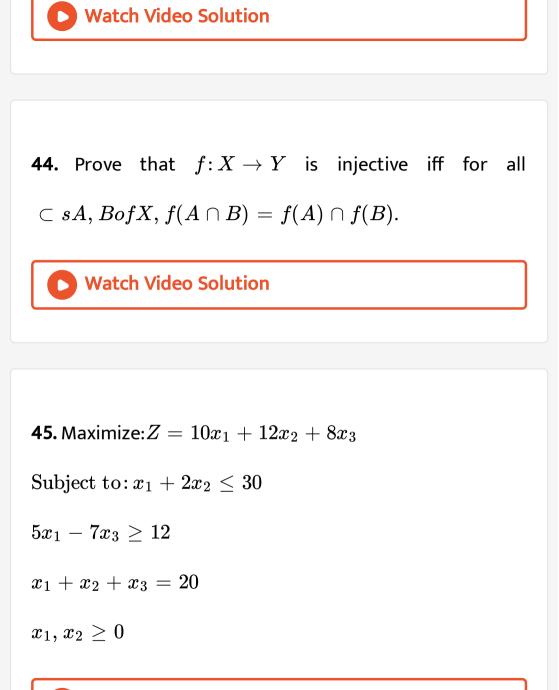
and the circle  $x^2 + y^2 = 2x$ .

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**42.** Find the distance of the point (1, -1, -10) from the line  $\frac{x-4}{1} = \frac{y+3}{-4} = \frac{z+1}{7}$  measured parallelto the line  $\frac{x+2}{2} = \frac{y-3}{-3} = \frac{z-4}{8}$ 

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**43.** Show by vector method that the four points (6, 2, -1), (2, -1, 3), (-1, 2, -4) and (-12, -1, -3) are coplanar.



**46.** If 
$$\sin^{-1}\left(\frac{x}{a}\right) + \sin^{-1}\left(\frac{y}{b}\right) = \sin^{-1}\left(\frac{c^2}{ab}\right)$$
, then prove that  $b^2x^2 + 2xy\sqrt{a^2b^2 - c^4} + a^2y^2 = c^4$ 

