



## MATHS

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

# **PREVIOUS YEAR QUESTION 2016**

**Previous Year Question** 

1. If p and q are the order and degree of the differential

$$y igg( rac{dy}{dx} igg)^2 + x^2 rac{d^2 y}{dx^2} + xy = \sin x,$$
 then choose the

correct statement out of (i) p>q, (ii) p=q, (iii)

p < q.

**2.** If 
$$\left|\overrightarrow{a}\right| = 3$$
,  $\left|\overrightarrow{b}\right| = 2$  and  $\overrightarrow{a} \cdot \overrightarrow{b} = 0$ , then write the value of  $\left|\overrightarrow{a} \times \overrightarrow{b}\right|$ .

### Watch Video Solution

**3.** Write the distance between parallel planes 
$$2x - y + 3z = 4$$
 and  $2x - y + 3z = 18$ .

4. Write the equation of the sphere concentric with

the sphere

 $x^2+y^2+z^2-4x-2x-2y+2z-30=0$  and

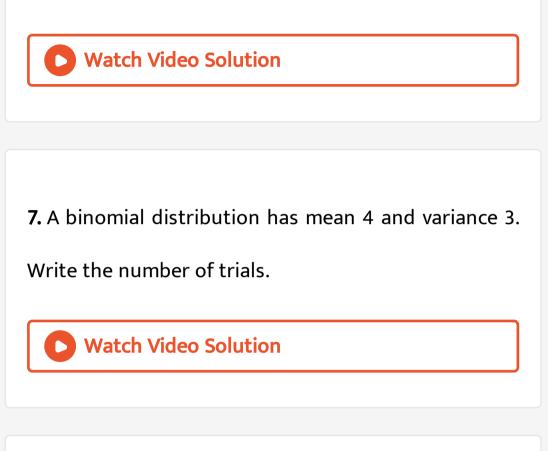
passing through the origin.

Watch Video Solution

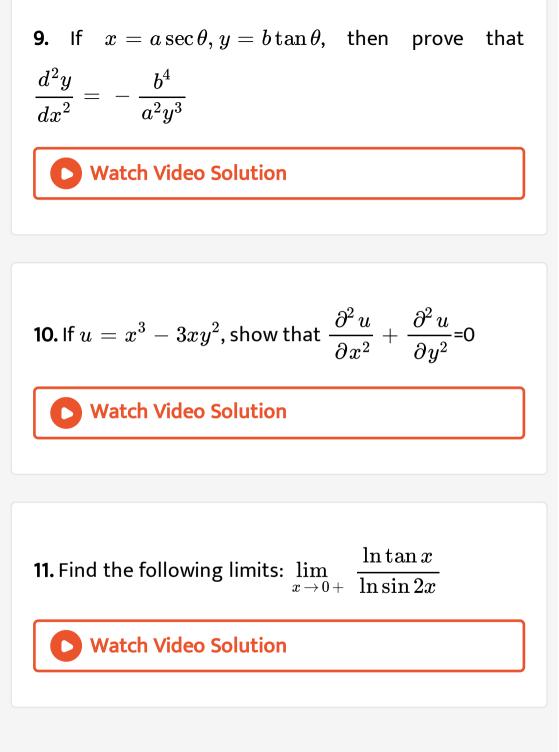
5. If A is a  $4 \times 5$  matrix and B is a matrix such that  $A^TB$  and  $BA^T$  both are defined, then write the order of B.



**6.** If  ${}^{n}C_{r} = {}^{n}P_{r}, r \neq 1$ , then write the value of r.



**8.** Find 
$$\displaystyle rac{dy}{dx}$$
, if  $x^my^n=\left(\displaystyle rac{x}{y}
ight)^{m+n}$ 



12. The radius of a spherical soap bubble is increasing at the rate of 0.2cm/sec. Find the rate of increase of its surface area, when the radius is 7cm. ( $\pi = 3.141$ approx)

**Watch Video Solution** 

13. If 
$$f'(x) = e^x + \frac{1}{1+x^2}$$
 and  $f(0) = 1$ , then find f(x).

**14.** Evaluate : 
$$\int (\log x)^2 dx$$



## Watch Video Solution

15. Evaluate: 
$$\int rac{2x+9}{\left(x+3
ight)^2} dx$$



16. 
$$\int_{0}^{1} rac{x^{5} \left(4-x^{2}
ight)}{\sqrt{1-x^{2}}} dx$$

Watch Video Solution

17. Evaluate 
$$\int \frac{\sin x \cos x}{\sin^2 x - 2 \sin x + 3} dx$$

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

 $ydy + e^{-y}x\sin xdx = 0$ 

Watch Video Solution

19. Solve: 
$$ig(x^2-1ig)rac{dy}{dx}+2xy=1$$



**20.** Prove that : 
$$\left| \overrightarrow{a} + \overrightarrow{b} \right| \leq \left| \overrightarrow{a} \right| + \left| \overrightarrow{b} \right|$$

21. Calculate the area of the triangle ABC (by vector

method) where A(1,2,4), B(3,1,-2), C(4,3,1)

Watch Video Solution

**22.** The projection of a line segment  $\overline{OP}$ , through origin O, on the co-ordinate axes are 6, 2, 3. Find the length of the line segment OP and its direction cosines.



23. passing through the point (-1, 3, 2)perpendicular to the planes x + 2y + 2z = 5 and 3x + 3y + 2z = 8.

Watch Video Solution

24. Prove that the lines 
$$\frac{x+4}{3} = \frac{y+6}{5} = \frac{z-1}{-2}$$
  
and  $3x - 2y + z + 5 = 0 = 2x + 3y + 4z - 4$  are co-planar.

25. Solve the following LPP graphically

Maximize, Z=20x+30y

Subject to  $3x+5y\leq 15$ 

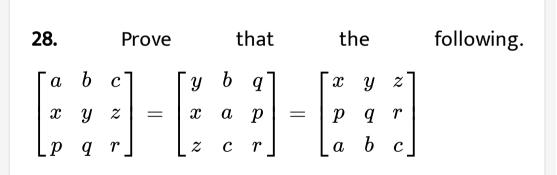
 $x,y\geq 0.$ 

Watch Video Solution

#### 26. Find the feasible region of the following system

$$2x+y\geq 6, x-y\leq 3, x\geq 0, y\geq 0$$

27. Show that (a+1) is a factor of  $\begin{vmatrix} (a+1) & 2 & 3 \\ 1 & a+1 & 3 \\ 3 & -6 & a+1 \end{vmatrix}$ 





**29.** If  $A = \begin{bmatrix} \alpha & 0 \\ 1 & 1 \end{bmatrix}$  and  $B = \begin{bmatrix} 1 & 0 \\ 5 & 1 \end{bmatrix}$ , show that for no values of  $\alpha$ ,  $A^2 = B$ .

Watch Video Solution

30. How many 4 digit numbers each greater than

6000 can be formed with be digits 5, 6, 7 and 8?



**31.** If 
$$m = {}^nC_2$$
, prove that  ${}^nC_2 = 3(n+1)C_4$ .

**32.** If the ratio of the 3rd term from the beginning to

the 3rd term from the end in the expansion of  $\left(1+\sqrt{2}
ight)^n$  is  $rac{1}{8}$ , then find the value of n.

Watch Video Solution

**33.** Let A and B be events with 
$$P(A) = \frac{1}{3}, P(A \cup B) = \frac{3}{4}, P(A \cap B) = \frac{1}{4}$$
, find  $P(A \cup B^C)$ .

34. If X follows a binomial distribution with parameter

n=6 and p with 4P(X=4)=P(X=2), find p.

Watch Video Solution  
35. If 
$$x = \frac{1 - \cos^2 \theta}{\cos \theta}$$
,  $y = \frac{1 - \cos^{2n} \theta}{\cos^n \theta}$  then show  
that  $\left(\frac{dy}{dx}\right)^2 = n^2 \left(\frac{y^2 + 4}{x^2 + 4}\right)$   
Watch Video Solution

**36.** Shows that the triangle of greatest area that can

be inscribed in a circle is equilateral.

\A/\_L\_

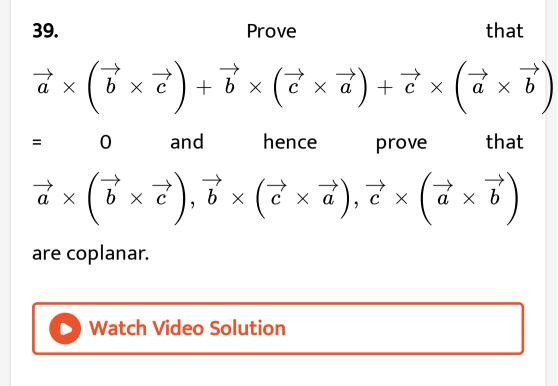
37. Determine the area common to the parabola

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

Watch Video Solution

**38.** Find the solution of the following differential equations:

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



**40.** A variable plane meets the coordinate axes at P, Q, R points. If the plane passes through a fixed point (a, b, c), prove that the centre of the shpere passing the origin and P, Q, R will lie on the surface  $\frac{a}{x} + \frac{b}{y} + \frac{c}{z} = 2$ 



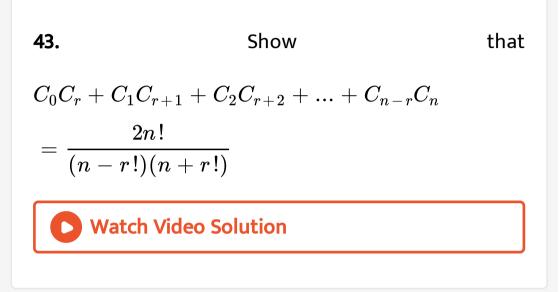
41. Solve the following LPP graphically : Maximize :  $Z = 5x_1 + 3x_2$  subject to :  $3x_1 + 5x_2 \le 15$   $5x_1 + 2x_2 \le 10 x_1, x_2 \ge 0$ Watch Video Solution

**42.** Solve the following system of equations by the matrix inversion method.

x + y + z = 4

2x - y + 3z = 1

and 3x + 2y - z = 1



**44.** Three persons hit a target with probability  $\frac{1}{2}$ ,  $\frac{1}{3}$  and  $\frac{1}{4}$  respectively. If each one shoot at the target once,

find the probability that exactly one of them hits the

target



