

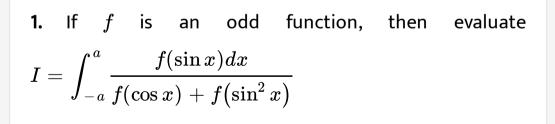


### MATHS

## **BOOKS - ARIHANT PRAKASHAN**

# **EXAMINATION PAPER 2019**





**2.** Write the order of the differential equation whose solution is given by

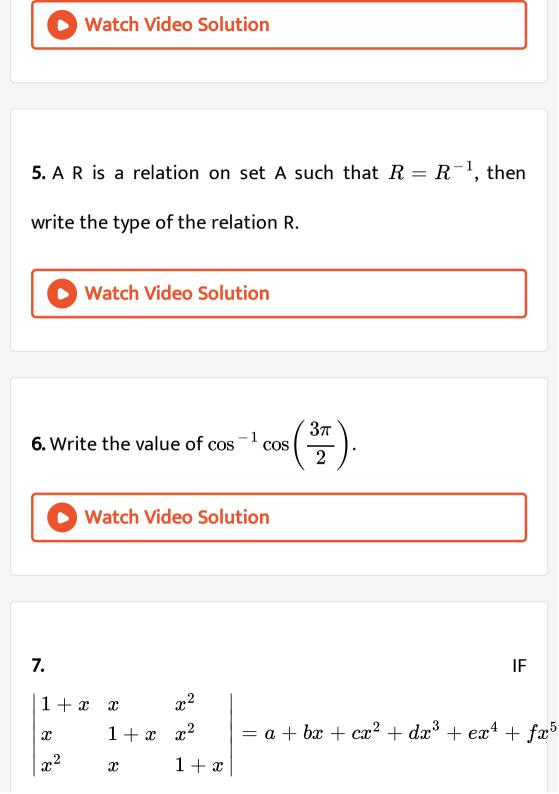
 $y = (c_1 + c_2) {
m cos}(x + c_3) + c_4 e^{x + c_5}$ 

where  $c_1, c_2, c_3, c_4$  and  $c_5$  are arbitrary constants

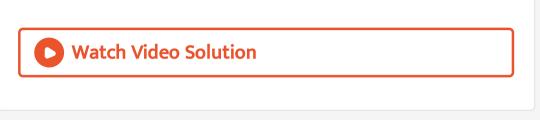


**3.** If 
$$\overrightarrow{a} = \overrightarrow{b} + \overrightarrow{c}$$
, then write the value of  $\overrightarrow{a}$ .  $\left(\overrightarrow{b} \times \overrightarrow{c}\right)$ 

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



then write the value of a.



8. Let A and B be two mutually exclusive events such that

 $P(A)=rac{1}{2} \,\, {
m and} \,\, P(B)=rac{1}{3} \,\,$  . Write the value of  $P(A\cap B)$ 

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9. If 
$$f'(2^+)=0$$
 and  $f'(2^-)=0$ , then is  $f(x)$ 

continuous at x = 2?



1. Prove that :

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

`=2"tan"^(-1)(sqrt((a-b)/(a+b)) "tan" x/2)



**2.** Construct the multiplication table  $\times_7$  on the set

{1,2,3,4,5,6}. Also find the inverse element of 4 if it exists.



**3.** 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.

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

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5. Find the probability distribution of

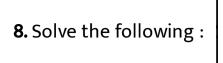
number of heads in three tosses of a coin.

**6.** 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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7. If 
$$A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$$
 then show that  $A^3 - 23A - 40I = O$ 



$$egin{array}{ccc} x+1 & \omega & \omega^2 \ \omega & x+\omega^2 & 1 \ \omega^2 & 1 & x+\omega \end{bmatrix}$$
=0

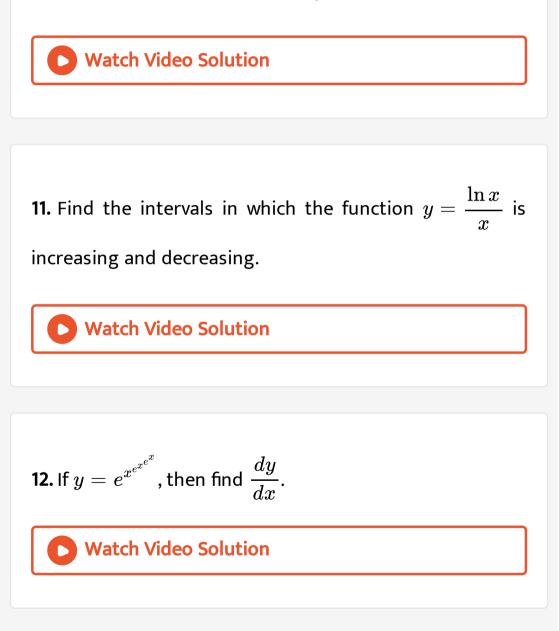


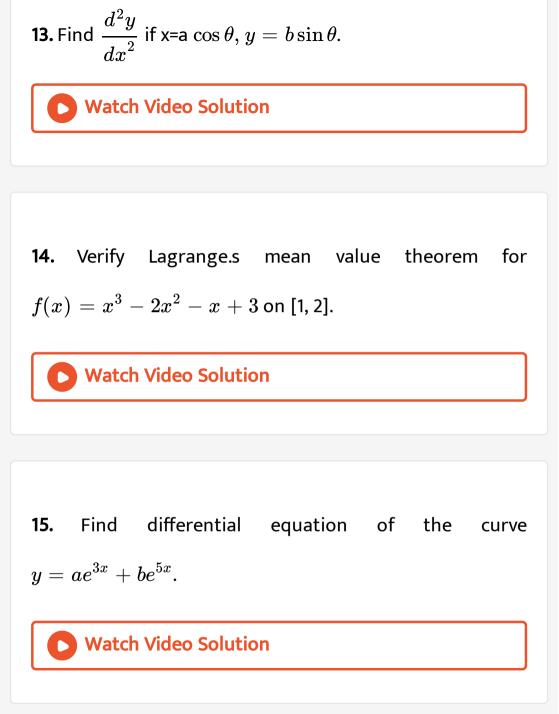
**9.** A person takes 4 tests in succession. The probability of his passing the first test is p, that of his passing each succeeding test is p or  $\frac{p}{2}$  depending on his passing or failing the preceding test, Find the probability of his passing

just three tests.

10. Find the point on the curve  $x^2 + y^2 - 4xy + 2 = 0$ ,

where the normal to the curve is parallel to the X-axis.





**16.** 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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17. Find the area of the region bounded by the curve  $y = 6x - x^2$  and the x-axis.

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**18.** 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 Direction Cosines 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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19. Find the point where the line 
$$rac{x-2}{1}=rac{y}{-1}=rac{z-1}{2}$$

meets the plane 2x + y + z = 2.

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**20.** Find a unit vector perpendicular to each of the vectors  $\overrightarrow{a} + \overrightarrow{b}$  and  $\overrightarrow{a} - \overrightarrow{b}$ , where  $\overrightarrow{a} = \hat{i} + \hat{j} + \hat{k}$  and  $\overrightarrow{b} = \hat{i} + 2\hat{j} + 3\hat{k}$ .

21. Prove that 
$$\left(\overrightarrow{a} \times \overrightarrow{b}\right)^2 = a^2b^2 - \left(\overrightarrow{a} \cdot \overrightarrow{b}\right)^2$$
.  
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22. Find the vector equation of a plane which is at a distance of 3 units from the origin  $2\hat{i} + 3\hat{j} - 6\hat{k}$  being a normal to the plane . Also get its cartesian equation  
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1. If 
$$e^{y/x} = \frac{x}{a+bx}$$
 then show that  $x^3 \frac{d}{dx} \left( \frac{dy}{dx} \right) = \left( x \frac{dy}{dx} - y \right)^2$  Watch Video Solution

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

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



**3.** Determine the area common to the parabola  $y^2 = x$ and the circle  $x^2 + y^2 = 2x$ .

**4.** Find the solutions of the following differential equations :

$$y^2+x^2rac{dy}{dx}=xyrac{dy}{dx}$$

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5. Show by vector method that the four points (6, 2, -1), (2,

-1, 3), (-1, 2, -4) and (-12, -1, -3) are coplanar.

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**6.** 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  $\frac{x+2}{2} = \frac{y-3}{-3} = \frac{z-4}{8}$ 



7. 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  $b^2x^2+2xy\sqrt{a^2b^2-c^4}+a^2y^2=c^4$ 

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8. Prove that  $f \colon X o Y$  is injective iff for all  $\sub{sA}, BofX, f(A \cap B) = f(A) \cap f(B).$ 

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

x-2y=3

3x+4y-z=-2

5x-3z=-1



**10.** 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?



**11.** Find the inverse of the following matrix using elementary transformation :  $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \\ 1 & 0 & 2 \end{bmatrix}$