



# MATHS

## **BOOKS - ARIHANT PRAKASHAN**

# **VERY SIMILAR TEST 7**

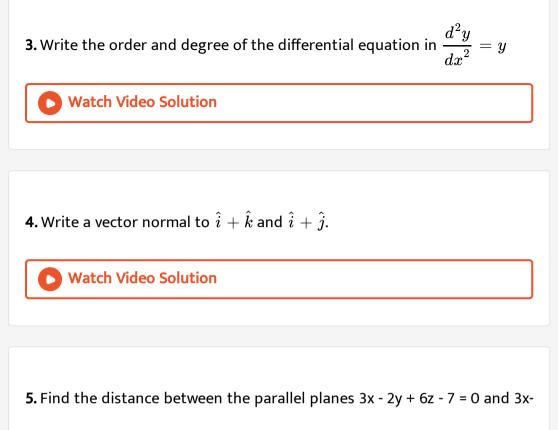
Section A 10 Marks

1. Write the set of points, where the function  $f(x)=x^3$  has relative

(local) extreme.

Watch Video Solution

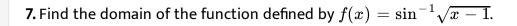
2. Evaluate 
$$\int_0^{\pi/2} e^x (\sin x - \cos x) dx.$$

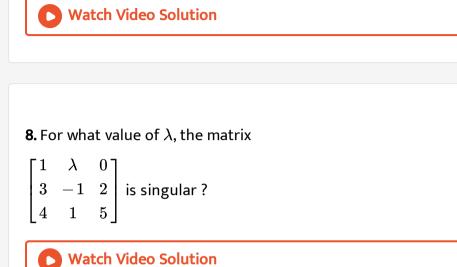


```
2y + 6z + 14 = 0.
```

Watch Video Solution

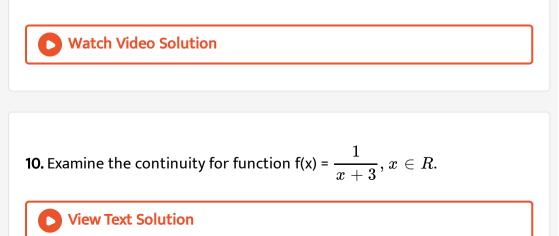
6. Consider f : (1,2,3)  $\rightarrow$  {a,b,c) given by f(1) = a, f(2)=b, f(3) = c. Find  $f^{-1}$ . Show that  $(f^{-1})^{-1}$  = f.





9. Two cards are drawn from a pack of 52 cards, find the probability that

they are of different suits.



11. Write the set of points, where the function  $f(x)=x^3$  has relative

(local) extreme.

12. Evaluate 
$$\int_0^{\pi/2} e^x (\sin x - \cos x) dx.$$

Watch Video Solution

13. Write the order and degree of the differential equation in  $rac{d^2y}{dx^2}=y$ 

Watch Video Solution

14. Write a vector normal to  $\hat{i} + \hat{k}$  and  $\hat{i} + \hat{j}$ .

**15.** Find the distance between the parallel planes 3x - 2y + 6z - 7 = 0 and

$$3x - 2y + 6z + 14 = 0.$$



**16.** Consider f : (1,2,3) → {a,b,c) given by f(1) = a, f(2)=b, f(3) = c. Find  $f^{-1}$ . Show that  $(f^{-1})^{-1}$  = f.

Watch Video Solution

**17.** Find the domain of the function defined by  $f(x) = \sin^{-1}\sqrt{x-1}$ .



**18.** For what value of  $\lambda$ , the matrix

 $egin{bmatrix} 1 & \lambda & 0 \ 3 & -1 & 2 \ 4 & 1 & 5 \end{bmatrix}$  is singular ?



19. Two cards are drawn from a pack of 52 cards, find the probability that

they are of different suits.

Watch Video Solution 20. Examine the continuity for function  $f(x) = \frac{1}{x+3}, x \in R$ . View Text Solution Section B 60 Marks

1. Evaluate 
$$an \left( \sin^{-1} rac{3}{5} + \cot^{-1} rac{3}{2} 
ight)$$
.

**2.** One kind of cake requires 200 g of flour and 25 g of fat and another kind of cake requires 100 g of flour and 50 g of fat. 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, formulate the problem as LPP.



3. Let \* be a binary operation on Q defined by a \* b = ab + 1. Determine whether \* is commutative but not associative.

Watch Video Solution

**4.** Let A = R-{2} and B = R - {1}. If  $f : A \rightarrow B$  is a function defined by  $f(x) = \frac{x-1}{x-2}$  then show that f is one-one and onto. Hence, find  $f^{-1}$ .

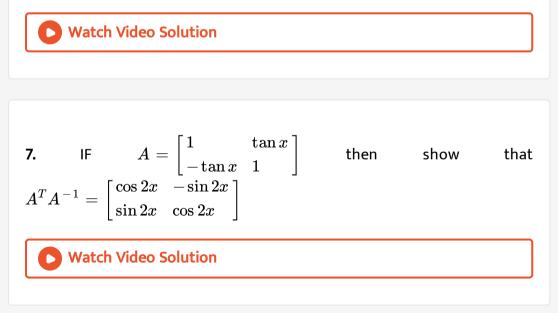


5. Prove that following

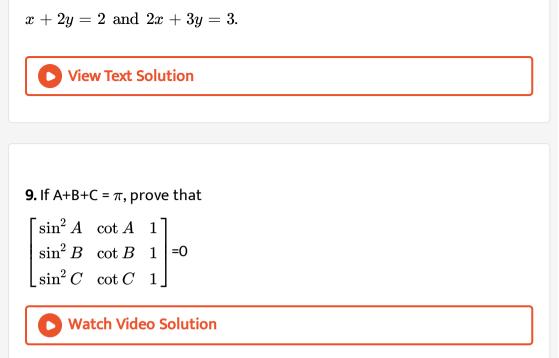
$$\cot^{-1}igg(rac{xy+1}{x-y}igg) + \cot^{-1}igg(rac{yz+1}{y-z}igg) + \cot^{-1}igg(rac{zx+1}{z-x}igg) = 0, (0 < xy, yz, yz)$$

Watch Video Solution

6. There are 25 tickets bearing numbers from 1 to 25. One ticket is drawn at random. Find the probability that the number on it is a multiple of 5 or6.



**8.** Show that the following systems of linear equations is consistent and also find their solution by using inverse of a matrix,

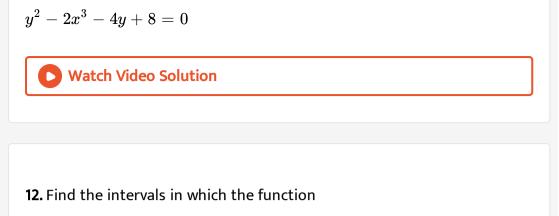


**10.** Find the probability distribution of number of doublets in four throws of a pair of dice. Find also the mean and the variance of the number of doublets.



11. Find the equasion of the tangents drawn from the point (1,2) to the

curve.



 $y={
m sin}x, x\in [0,2\pi]$  is increasing and decreasing.

Watch Video Solution

13. If 
$$y=\left(\sin^{-1}x
ight)^2$$
, prove that

$$ig(1-x^2ig)y_2 - xy_1 - 2 = 0$$

Watch Video Solution

14. Differentiate  $\log_{10} x + \log_x 10 + \log_x x + \log_{10} 10$ .



15. Verify the LMVT for the function  $f(x)=rac{1}{4x-1}, 1\leq x\leq 4.$ 

Watch Video Solution

**16.** Find the solution of the differential equation.

$$(x-y-2)dx+(x-2y-3)dy=0$$

View Text Solution

17. Find the differential equation by eleminating the orbitary constants in

the curve  $ax^2 + by = 1$ .

Watch Video Solution

18. Evaluate the following integrals :

 $\int \frac{e^{6\log x} - e^{5\log x}}{e^{4\log x} - e^{3\log x}} dx.$ 

19. Prove that 
$$\int_{-1}^{1} \log \left( \frac{2-x}{2+x} \right) dx = 0$$
  
Watch Video Solution

**20.** Find the area enclosed bt the two paraboles  $y^2=4$  ax and  $x^2=4$ ay.

**21.** By computing shortest distance, determine whether the following pair of lines intersect or not  $\overrightarrow{r} = (4\hat{i} + 5\hat{j}) + \lambda(\hat{i} + 2\hat{j} - 3\hat{k})$  and  $\overrightarrow{r} = (\hat{i} - \hat{j} + 2\hat{k}) + \mu(2\hat{i} + 4\hat{j} - 5\hat{k}).$ 

Watch Video Solution

22. Find the equation of the plane Paralel to the plane 2x - y + 3z + 1 = 0 and at a distance 3 units away from it.



**23.** If  $\overrightarrow{a}$ ,  $\overrightarrow{b}$  and  $\overrightarrow{c}$  are three mutually perpendicular vectors of equal magnitude, then find the angle between  $\overrightarrow{a}$  and  $\left(\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c}\right)$ .

Watch Video Solution

**24.** If 
$$\overrightarrow{a}$$
,  $\overrightarrow{b}$  and  $\overrightarrow{c}$  are three vectors, such that  $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} = \overrightarrow{0}$ , then prove that  $\overrightarrow{a} \times \overrightarrow{b} = \overrightarrow{b} \times \overrightarrow{c} = \overrightarrow{c} \times \overrightarrow{a}$ .

### Watch Video Solution

**25.** If  $\hat{a}$ ,  $\hat{b}$ ,  $\hat{c}$  are unit vectors and  $\hat{a} \times (\hat{b} \times \hat{c}) = \frac{1}{2}\hat{b}$ , then find the angles that  $\hat{a}$  makes with  $\hat{b}$  and  $\hat{c}$  where  $\hat{b}$ ,  $\hat{c}$  are not parallel.

26. Evaluate 
$$an\left(\sin^{-1}\frac{3}{5} + \cot^{-1}\frac{3}{2}\right)$$
.

Watch Video Solution

**27.** One kind of cake requires 200 g of flour and 25 g of fat and another kind of cake requires 100 g of flour and 50 g of fat. 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, formulate the problem as LPP.

> Watch Video Solution

28. Let \* be a binary operation on Q defined by a\*b = ab + 1. Determine whether \* is commutative but not associative.

**29.** Let A = R-{2} and B = R - {1}. If f : A  $\rightarrow$  B is a function defined by f(x)=  $\frac{x-1}{x-2}$  then show that f is one-one and onto. Hence, find  $f^{-1}$ .

#### 30. Prove that following

$$\cot^{-1}igg(rac{xy+1}{x-y}igg) + \cot^{-1}igg(rac{yz+1}{y-z}igg) + \cot^{-1}igg(rac{zx+1}{z-x}igg) = 0, (0 < xy, yz,$$

Watch Video Solution

31. There are 25 tickets bearing numbers from 1 to 25. One ticket is drawn

at random. Find the probability that the number on it is a multiple of 5 or

6.



**32.** IF 
$$A = \begin{bmatrix} 1 & \tan x \\ -\tan x & 1 \end{bmatrix}$$
 then show that  $A^T A^{-1} = \begin{bmatrix} \cos 2x & -\sin 2x \\ \sin 2x & \cos 2x \end{bmatrix}$  Watch Video Solution

**33.** Show that the following systems of linear equations is consistent and also find their solution by using inverse of a matrix, x + 2y = 2 and 2x + 3y = 3.

View Text Solution

**34.** If A+B+C =  $\pi$ , prove that

$$\begin{bmatrix} \sin^2 A & \cot A & 1\\ \sin^2 B & \cot B & 1\\ \sin^2 C & \cot C & 1 \end{bmatrix} = 0$$

**35.** Find the probability distribution of number of doublets in four throws of a pair of dice. Find also the mean and the variance of the number of doublets.

36. Find the equasion of the tangents drawn from the point (1,2) to the

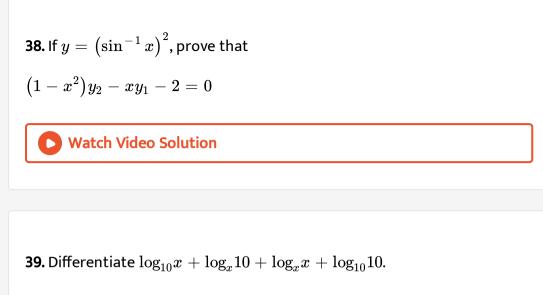
curve.

 $y^2 - 2x^3 - 4y + 8 = 0$ 

Watch Video Solution

37. Find the intervals in which the function

 $y={
m sin}x, x\in [0,2\pi]$  is increasing and decreasing.



View Text Solution

**40.** Verify the LMVT for the function  $f(x)=rac{1}{4x-1}, 1\leq x\leq 4.$ 

Watch Video Solution

**41.** Find the solution of the differential equation.

$$(x-y-2)dx+(x-2y-3)dy=0$$

View Text Solution

42. Find the differential equation by eleminating the orbitary constants in

the curve  $ax^2 + by = 1$ .



**43.** Evaluate 
$$\int \! rac{e^{6 \mathrm{log} x} - e^{5 \mathrm{log} x}}{e^{4 \mathrm{log} x} - e^{3 \mathrm{log} x}} dx$$

Watch Video Solution

**44.** Prove that 
$$\int_{-1}^1 \log igg(rac{2-x}{2+x}igg) dx = 0$$

Watch Video Solution

**45.** Find the area enclosed bt the two paraboles  $y^2=4$  ax and  $x^2=4$ ay.

46. By computing shortest distance, determine whether the following pair

of lines intersect or not 
$$\overrightarrow{r}=\left(4\hat{i}+5\hat{j}
ight)+\lambda\Big(\hat{i}+2\hat{j}-3\hat{k}\Big)$$
 and  $\overrightarrow{r}=\Big(\hat{i}-\hat{j}+2\hat{k}\Big)+\mu\Big(2\hat{i}+4\hat{j}-5\hat{k}\Big).$ 

Watch Video Solution

**47.** Find the equation of the plane Paralel to the plane 2x - y + 3z + 1 = 0 and at a distance 3 units away from it.

Watch Video Solution

**48.** If  $\overrightarrow{a}$ ,  $\overrightarrow{b}$  and  $\overrightarrow{c}$  are three mutually perpendicular vectors of equal magnitude, then find the angle between  $\overrightarrow{a}$  and  $\left(\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c}\right)$ . Watch Video Solution **49.** If  $\overrightarrow{a}$ ,  $\overrightarrow{b}$  and  $\overrightarrow{c}$  are three vectors such that  $\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c} = \overrightarrow{0}$ , then prove that  $\overrightarrow{a} \times \overrightarrow{b} = \overrightarrow{b} \times \overrightarrow{c} = \overrightarrow{c} \times \overrightarrow{a}$ .

### Watch Video Solution

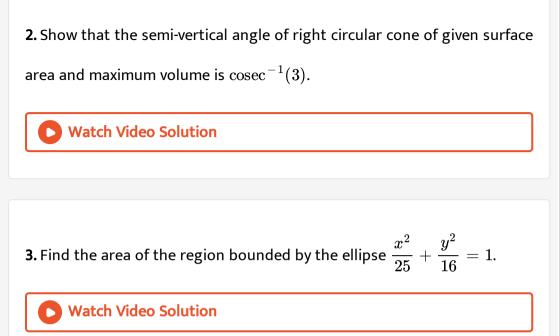
**50.** If  $\hat{a}, \hat{b}, \hat{c}$  are unit vectors and  $\hat{a} \times (\hat{b} \times \hat{c}) = \frac{1}{2}\hat{b}$ , then find the angles that  $\hat{a}$  makes with  $\hat{b}$  and  $\hat{c}$  where  $\hat{b}, \hat{c}$  are not parallel.

Watch Video Solution

Section C 30 Marks

1. If cos y = x cos(a+y) then prove that

$$rac{dy}{dx} = rac{\cos^2(a+y)}{\sin a}$$



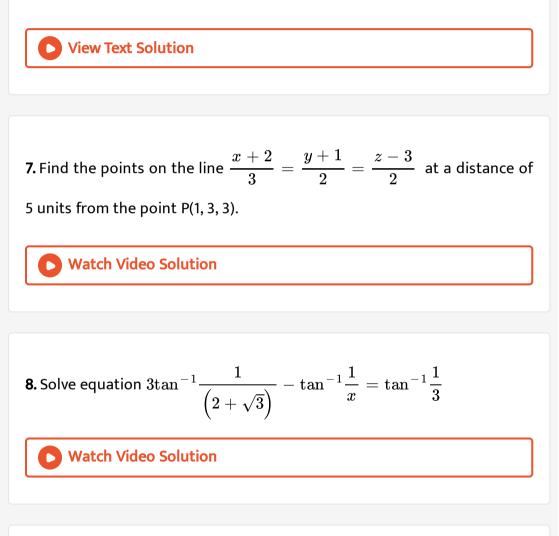
4. Find the solutions of the following differential equations :

$$x\sinrac{y}{x}dy=\Big(y\sinrac{y}{x}-x\Big)dx$$

Watch Video Solution

5. 
$$\int \frac{\cos x - \sin x}{\sqrt{8 - \sin 2x}} dx$$

**6.** Find the distance of the point (1, -2, 3) from the plane x - y + z = 5 measured parallel to the line whose direction cosines are proportional to (2, 3, -6).



9. Solve the following LPP graphically

Maximize,  $Z = 5x_1 + 3x_2$ 

Subject to  $3x_1+5x_2\leq 15$  $5x_1+2x_2\leq 10$  $x_1,x_2\geq 0$ 



**10.** Show that the operation \* given by  $x^*y=x+y+$  -xy is a binary oeration on

Z,Q and R but not on N.

Watch Video Solution

11. Examining consistency and solvability, solve the following equation by

matrix method.

x+2y-3z=4

2x+4y-5z=12

3x-y+z=3

12. From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random,

is a smoker

Watch Video Solution

**13.** From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random,

is alcoholic

14. From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random,

chews gutka

Watch Video Solution

**15.** From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random,

has no specific carcinogenic habits.



16. Find the inverse of matix  $A = \begin{bmatrix} 1 & 2 & 4 \\ -1 & -2 & -1 \\ 2 & 1 & -1 \end{bmatrix}$  by elementary

transformation method and verify that "AA"^(-)=I`.

View Text Solution

**17.** If cos y = x cos(a+y) then prove that

$$rac{dy}{dx} = rac{\cos^2(a+y)}{\sin a}$$



**18.** Show that the semi-vertical angle of right circular cone of given

surface area and maximum volume is  $\csc^{-1}(3)$ .

**19.** Find the area of the portion of the ellipse  $rac{x^2}{12}+rac{y^2}{16}=1$ , bounded by

the major-axis and the double ordiante x = 3.



20. Find the solutions of the following differential equations :

$$x\sinrac{y}{x}dy=\Big(y\sinrac{y}{x}-x\Big)dx$$

Watch Video Solution

21. 
$$\int \frac{\cos x - \sin x}{\sqrt{8 - \sin 2x}} dx$$

**22.** Find the distance of the point (1, -2, 3) from the plane x - y + z = 5 measured parallel to the line whose direction cosines are proportional to

(2, 3, -6).

**23.** Find the points on the line 
$$\frac{x+2}{3} = \frac{y+1}{2} = \frac{z-3}{2}$$
 at a distance

of 5 units from the point P(1, 3, 3).

Watch Video Solution

**24.** Solve equation 
$$3 an^{-1}rac{1}{\left(2+\sqrt{3}
ight)}- an^{-1}rac{1}{x}= an^{-1}rac{1}{3}$$

**Watch Video Solution** 

25. Solve the following LPP graphically

Maximize,  $Z=5x_1+3x_2$ 

Subject to  $3x_1+5x_2\leq 15$ 

 $5x_1+2x_2\leq 10$ 

 $x_1, x_2 \geq 0$ 

26. Show that the operation \* given by x\*y=x+y+ -xy is a binary oeration on

Z,Q and R but not on N.



**27.** Examine consistency and solvability, solve the following equations by matrix method.

x + 2y + 3z = 14

2x - y + 5z = 15

and 2y + 4z - 3x = 13

View Text Solution

**28.** From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a

cancer patient chosen from any one of the above types, selected at random,

chews gutka



**29.** From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random,

chews gutka



**30.** From a survey conducted in a cancer hospital it is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of

alcoholics, 50 % of the non specific, then estimateic the probability that a cancer patient chosen from any one of the above types, selected at random,

chews gutka

Watch Video Solution

**31.** From a survey conducted in a cancer hospital. It is found that 10% of the patients were alcoholics, 30% chew gutka and 40% have no specific carcinogenic habits. If cancer strikes 80% of the smokers, 70% of alcoholics, 50% of gutka chewers and 10% of the non-specific, then estimate the probability that a cancer patient chosen from any one of the above types, selected at random,

(iv) has no specific carcinogenic habits.

View Text Solution

**32.** Find the inverse of matix  $A = \begin{bmatrix} 1 & 2 & 4 \\ -1 & -2 & -1 \\ 2 & 1 & -1 \end{bmatrix}$  by elementary

transformation method and verify that "AA"^(-)=I`.

View Text Solution