



# MATHS

# **BOOKS - ARIHANT PRAKASHAN**

# **VERY SIMILAR TEST 4**

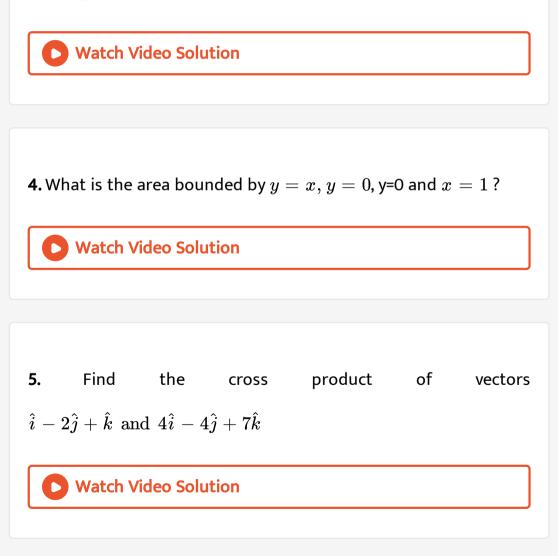


1. Differentiate  $an^{-1} x$  w.r.t.  $\cot^{-1} x$ 



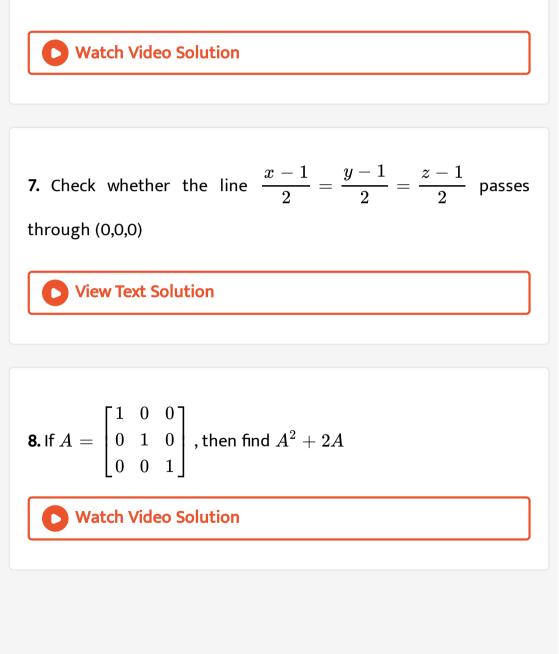
2. Obtain a differential eqution that should be satisfied by the family of concentric circles  $x^2 + y^2 = a^2$ .

**3.** In a race, the probabilities of A and B winning the race are  $\frac{1}{3}$  and  $\frac{1}{6}$  respectively. Find the probability of neither of them winning the race.



6. If the area of circle increasing at a uniform rate, then prove that

perimetre varies inversely as the radius.



**9.** Show that the relation R on the set {1,2,3) given by R={(1,1), (2, 2),

(3, 3), (1, 2), (2, 3)) is reflexive but neither symmetric nor transitive.

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<b>10.</b> What is a constraint in a linear programming problem ?
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Section B
1. If $\tan^{-1}\left(rac{x-2}{x-4} ight)+\tan^{-1}\left(rac{x+2}{x+4} ight)=rac{\pi}{4}$ , then find ther value of x.
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**2.** If the function f:[1,  $\infty$ ) ightarrow  $[1,\infty)$  defined by f(x) =  $2^{x\,(\,x\,-\,1\,)}$  is

invertible, then find  $f^{\,-1}$  (x).



**3.** Two tailors P and Q earn ₹ 150 and ₹ 200 per day respectively. P can stitch 6 shirts and 4 trousers a day, while Q can stitch 10 shirts and 4 trousers per day. How many days should each work to produce atleast 60 shirts and 32 trousers at minimum labour cost ?

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**4.** Show that the relation is congruent to on the set all triangles in a plane is an equivalence relation

5. If 
$$\sin^{-1}x + \tan^{-1}x = rac{\pi}{2}$$
 , then prove that  $2x^2 + 1 = \sqrt{5}$ 

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6. For the matrices A and B , verify that (AB) =B'A' , where

$$A = \begin{bmatrix} 1 \\ -4 \\ 3 \end{bmatrix}$$
 and  $B = \begin{bmatrix} -1 & 2 & 1 \end{bmatrix}$ .

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7. If 
$$A = \begin{bmatrix} 1 & 2 \\ 0 & -1 \end{bmatrix}$$
 and  $B = \begin{bmatrix} 0 & 1 \\ 3 & 2 \end{bmatrix}$ , then show that  $|AB| = |A||B|$ 

**8.** A can hit a target 4 times out of 5 times, B can hit the target 3 times out of 4 times and C can hit the target 2 times out of 3 times. They fire simultaneously. Find the probability that any two out of A, B and C will hit the target.

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**9.** Find 
$$A^{-1}, ext{ if } A = egin{bmatrix} 2 & 4 \ 1 & 7 \end{bmatrix}$$

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10. A fair die is rolled consider the following events A={2,4,6} ,B=

{4,5} and C={3,4,5,6} Find

 $P(A \cup B/C)$ 

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12. If 
$$y = a \sin x + b \cos x$$
 , then prove that  $\displaystyle rac{d^2 y}{dx^2} + y = 0$ 

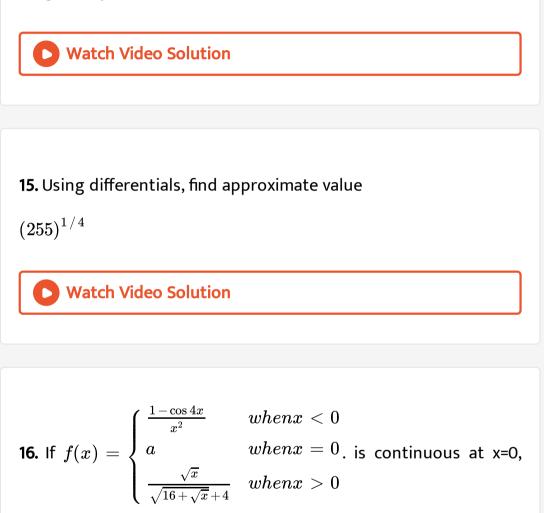
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13. Check whether Lagrange.s mean value theorem is applicable to

$$f(x) = x^{rac{1}{3}}, \; -1 < x < 1$$

**14.** Find the point on the curve,  $y = 2x^2 - 6x - 4$  at which the

tangent is parallel to x-axis



then the value of a will be.

**17.** Find 
$$\int x^2 e^x dx$$

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18. Find the particular solution of the differential equation log

$$\left(rac{dy}{dx}
ight)=3x+4y$$
 , given that y = 0 when x = 0

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19. Find the general solution of the differential equation  $\frac{dy}{dx} = y \tan x - y^2 \sec x$ 

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20. Find the area between X - axis and the curve y = sin x from x =

0 to x =  $2\pi$ 

21. Evaluate 
$$\int_0^1 e^x \left( rac{1}{x} - rac{1}{x^2} 
ight) \mathsf{d} \mathsf{x}$$

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**22.** Given that , 
$$\left|\overrightarrow{a}\right| = 1$$
 and  $\left|\overrightarrow{b}\right| = 1$  and  $\left|\overrightarrow{a} + \overrightarrow{b}\right| = \sqrt{3}$ . If  $\overrightarrow{c}$  is a vector such that  $\overrightarrow{c} - \overrightarrow{a} - 2\overrightarrow{b} = 3\left(\overrightarrow{a} \times \overrightarrow{b}\right)$ , then find the value of  $\overrightarrow{c} \cdot \overrightarrow{b}$ 

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**23.** Find the distance of the point (1, -2, 3) from the plane x - y + z = 5, measured parallel to the line  $\frac{x}{2} = \frac{y}{3} = \frac{z}{-6}$ 

24. If  $\overrightarrow{a}$ ,  $\overrightarrow{b}$  and  $\overrightarrow{c}$  are three non-coplanar vectors and  $\overrightarrow{r}$  is only find the value of arbitrary vector, then  $\left| \overrightarrow{b} \overrightarrow{c} \overrightarrow{r} \right| \overrightarrow{a} + \left[ \overrightarrow{c} \overrightarrow{a} \overrightarrow{r} \right] \overrightarrow{b} + \left| \overrightarrow{a} \overrightarrow{b} \overrightarrow{r} \right| \overrightarrow{c}$ View Text Solution 25. Find the image of the point A (1,0,0) in the line  $\frac{x-1}{2} = \frac{y+1}{-3} = \frac{z+10}{8}$ View Text Solution Find the shortest distance between the lines 26.  $\frac{x-1}{1} = \frac{y-2}{-1} = \frac{z-1}{1}$  and  $\frac{x-2}{2} = \frac{y+1}{1} = \frac{z+1}{2}$ 

1. Defferentiate

$$\sec^{-1}\left(rac{1}{2x^2-1}
ight)w.\ r.\ t.\ \sqrt{1-x^2}$$

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2. Show that  $\sin^P \theta \cos^q \theta$  attains a maximum value, when  $heta = an^{-1} \sqrt{rac{p}{q}}.$ 

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**3.** Evaluate 
$$\int_0^\pi rac{x}{a^2\cos^2 x + b^2\sin^2 x} dx$$

**4.** Find the area of the region {(x,y) :  $y^2 \leq 6$  ax and

 $x^2+y^2\leq 16a^2$ } by using integration



## 5. Solve the differential equation

$$xig(x^2-x^2y^2ig)dy+yig(y^2+x^2y^2ig)dx=0$$

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**6.** Find the image of a point having position vector  $\left(3\hat{i}-\hat{j}+\hat{k}
ight)$ 

in the plane 
$$\overrightarrow{r}\cdot\left(3\hat{i}+\hat{j}+4\hat{k}
ight)=2$$

7. Prove that by vector methord, in any  

$$\Delta ABC, \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}.$$
  
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8. If 
$$f: R \to R$$
 is given by  $f(x) = \sin^2 x + \sin^2 \left(x + \frac{\pi}{3}\right) + \cos x \cos \left(x + \frac{\pi}{3}\right)$  and  $g: R \to R$ 

is such g (5/4) = 1 . Show that go f : R 
ightarrow R is a constant function

## **D** View Text Solution

9. Solve for x,

$$an^{-1}(x-1) + an^{-1}x + an^{-1}(x+1) = an^{-1}3x.$$

**10.** Solve that following LPP graphically . Maximise : Z = 22 x + 18 y

subject to :  $x+y \leq 20, \, 3x+2y \leq 48, \, x \geq 0, \, y \geq 0$ 



11. If x,y,z are positive and are the pth, qth and rth terms of a G.P.

then prove that

 $egin{array}{c|c} \log x & p & 1 \ \log y & q & 1 \ \log z & r & 1 \ \end{array} = 0$ 

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**12.** If A = 
$$\begin{bmatrix} 1 & 0 & 2 \\ 0 & 2 & 1 \\ 2 & 0 & 3 \end{bmatrix}$$
 find k

**13.** Three cards are drawn successively with replacement from a well-shuffled deck of 52 cards. If getting a card of spade is a success, then find the probability distribution of number of successes

