



MATHS

BOOKS - ARIHANT PRAKASHAN

VERY SIMILAR TEST 5



1. What is the derivative of $\cos^{-1}ig(2x^2-1ig)$ if $\mathsf{x}\ \in\$ (-1,0).



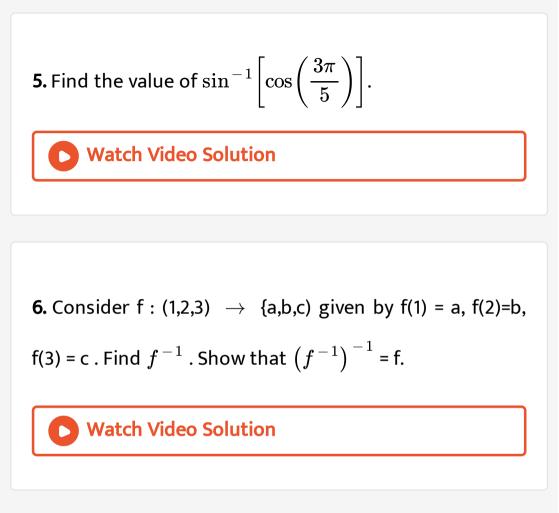
2. Show that the function $f(x) = \cos^2 x$ is strictly decreasing on $\left(0, \frac{\pi}{2}\right)$.

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3. Name of curve which is represented by the solution of

differential equation
$$2x \frac{dy}{dx} - y = 3$$

4. if
$$\left| \overrightarrow{a} + \overrightarrow{b} \right| = \left| \overrightarrow{a} - \overrightarrow{b} \right|$$
 the what is the relation between \overrightarrow{a} and \overrightarrow{b} ?



7. State true or False .The planes 2x + 4y - z + 1 = 0and x - 2y - 6z + 3 = 0 are perpendicular to each other.



8. Evaluate
$$\int_0^{\pi/4} an^2 x dx$$
.

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9. If
$$\begin{vmatrix} a & b & c \\ b & a & b \\ x & b & c \end{vmatrix} = 0$$
 then `x=____

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10. Three events A, B and C have probabilities $\frac{2}{5}, \frac{1}{3}$ and $\frac{1}{2}$, respectively. If

 $P(A \cap C) = \frac{1}{5}$ and $P(B \cap C) = \frac{1}{4}$, then find the values of P(C/B) and $P(A' \cap C')$.

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Section B

1. A binary operation \cdot on the set {0,1,2,3,4,5} is defined

as

$$a \cdot b = \left\{egin{array}{cc} a+b & ext{if}a+b < 6 \ a+b-6 & ext{if}a+b \geq 6 \end{array}
ight.$$

Find the composition table for \cdot Also, show that zero is the identity for this operation and each non-zero element a of the set is invertible with 6-a, being the inverse of a.



2. Discuss the commutativity and associativity of binary operation .*. defined on $A = Q - \{1\}$ by the rule a * b = a - b + ab for all $a, b \in A$. Also, find the identity element of * in A and hence find the invertible elements of A.



3. Directions (Q. Nos. 27 and 28) Solve the following

equations:

$$an^{-1}rac{x}{2}+ an^{-1}rac{x}{3}=rac{\pi}{4}, \sqrt{6}>x>0$$

4. Answer any three questions

(d) Solve the following LPP graphically Maximize and Minimize Z=3x+5ySubject to $3x-4y+12\geq 0$ $2x-y+2\geq 0$ $2x+3y-12\geq 0$ $0\leq x\leq 4$ $y\geq 2$

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5. Prove that

$$\tan\left\{\frac{\pi}{4} + \frac{1}{2}\cos^{-1}\frac{a}{b}\right\} + \tan\left\{\frac{\pi}{4} - \frac{1}{2}\cos^{-1}\left(\frac{a}{b}\right)\right\} = \frac{2b}{a}$$



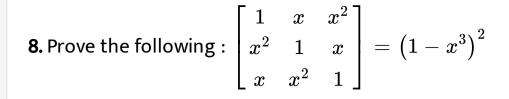
6. A die is rolled until a 6 is obtained. What is the probability that

you end up in the third roll.

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7. Let
$$A = \begin{bmatrix} 2 & -1 \\ 3 & 4 \end{bmatrix}$$
, $B = \begin{bmatrix} 5 & 2 \\ 7 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & 5 \\ 3 & 8 \end{bmatrix}$.

Find a matrix D such that CD -AB =O .





9. The probability that A hits a target is $\frac{1}{3}$ and the probability that B hits it is $\frac{2}{5}$. If each one of A and B shoots at the target, what is the probability that (i) the target is hit?

(ii) exactly one of them hits the target?



10. If
$$A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$$
 then prove that $A^2 - 4A - 5I = 0.$

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11. Verify Rolle.s theorem for the function $f(x) = x^2 - 3x + 2$ in the interval [1, 2]

12. If
$$x = \cos^{-1}\left(\frac{1}{\sqrt{1+t^2}}\right)$$
, $y = \sin^{-1}\left(\frac{1}{\sqrt{t^2+1}}\right)$
then $\frac{dy}{dx}$ is independent of t.

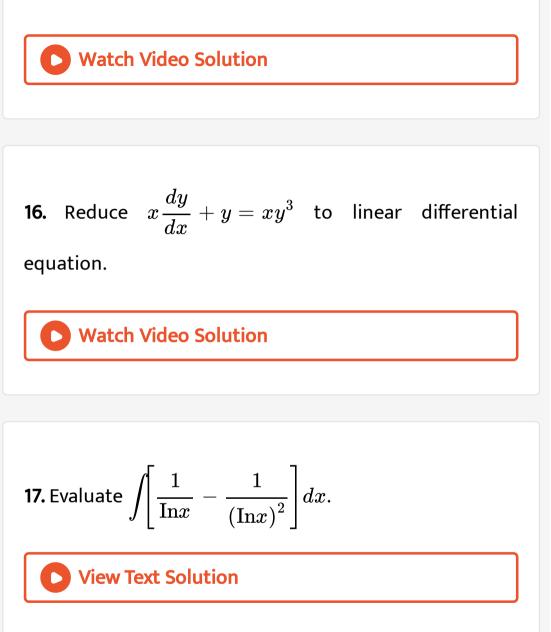
13. Find the equation of the normal at a point on the curve $x^2 = 4y$, which passes through the point (1, 2). Also, find the equation of the corresponding tangent.

14. Find
$$\frac{dy}{dx}$$
, if $y = k \tan^{-1} \left(\frac{y}{x} \right)$.

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15. Determine the interval in which the function $f(x) = x^3 - 5x^2 + 3x + 97$ is decreasing and that in which it is

increasing.



18. Find the differential equation for the family of curve

$$y = a\sin^{-1}x + b\cos^{-1}x.$$

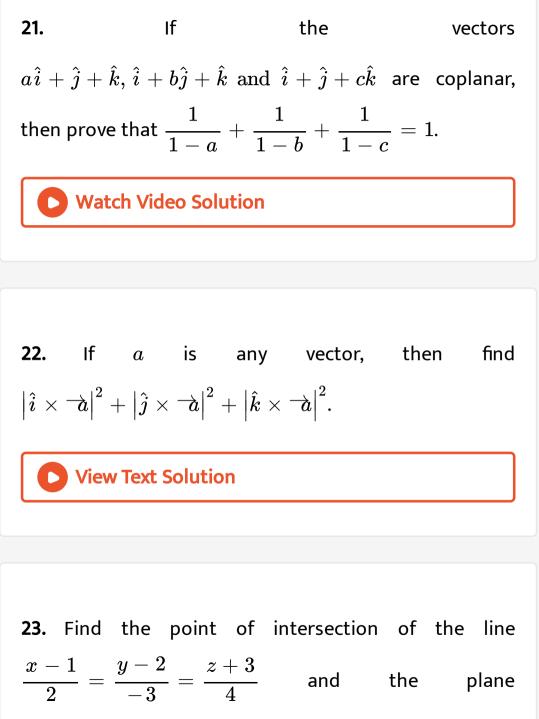
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19. Solve
$$rac{dy}{dx}=e^{\sin^{-1}x}.~rac{\sin^{-1}x}{\sqrt{1-x^2}}.$$

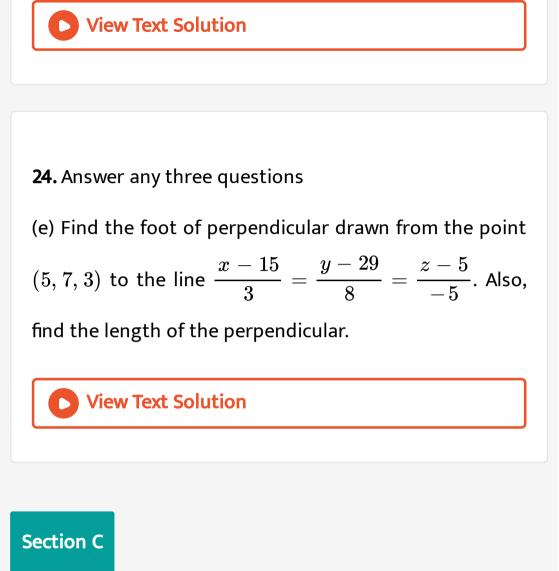
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20. Find the area bounded by the curve $y = 2x - x^2$

and the straight line y = -x.



2x + 4y - z + 1 = 0.



1. Answer any one question

(a) The radius of a wire as measured by a screw gauge is

found to be 1.26 mm. If the correct radius is 1.25 mm, then find the approximate error, relative error and percentage error in calculation of area of its cross section.

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2. If
$$x = \sin t$$
 and $y = \sin(pt)$, then show that
 $(1 - x^2) \frac{d^2 y}{dx^2} - x \frac{dy}{dx} + p^2 y = 0.$
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3. Evaluate $\int_0^{\pi} \frac{x \tan x}{\sec x \cos ecx} dx.$
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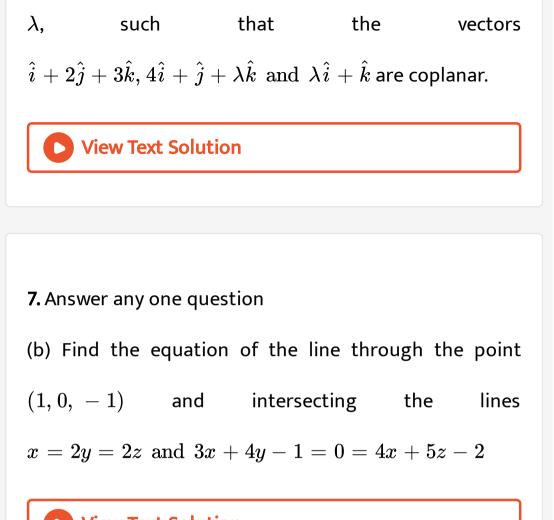
4. Solve
$$ig(1+x^2ig)rac{dy}{dx}+2xy-x^3=0.$$

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5. Using integration find the area of the region
$$\{(x,y): 25x^2 + 9y^2 \le 225 \text{ and } 5x + 3y \ge 15\}.$$

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6. Find the volume of parallelopiped, whose sides are given by vectors $\hat{i} + \hat{j} + \hat{k}$ and $3\hat{i} - \hat{j} + 2\hat{k}$, Also, find



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8. Answer any one question

(a) Show

$$2 \tan^{-1} \left\{ \tan \frac{\alpha}{2} \tan \left(\frac{\pi}{4} - \frac{\beta}{2} \right) \right\} = \tan^{-1} \frac{\sin \alpha . \cos \beta}{\cos \alpha + \sin \beta}$$

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9. Answer any one question

(b) Solve the following LPP.

Maximise : $Z = 10x + 2y$

Subject to

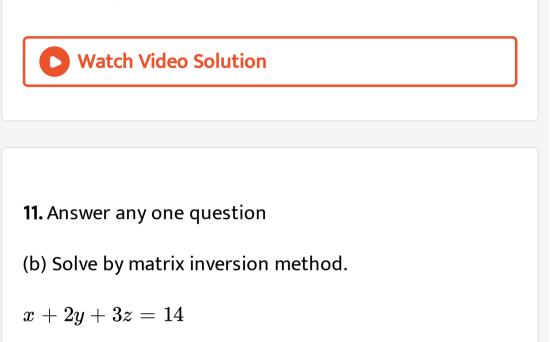
: $-x + y \ge -1, x + y \le 6, y \le 5, x, y \ge 0$

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10. If the function $f\colon R o R$ is given by $f(x)=rac{x+3}{3}$ and $g\colon R o R$ is given g(x)=2x-3, then find

(i) fog (ii) gof.

Is
$$f^{-1} = g$$
?



2x - y + 5z = 15

2y + 4z - 3x = 13

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12. Show that

$$egin{array}{cccc} \left. \left(b+c
ight)^2 & a^2 & a^2 \ b^2 & \left(c+a
ight)^2 & b^2 \ c^2 & c^2 & \left(a+b
ight)^2 \end{array}
ight| = 2abc(a+b+c)^3$$