

Class-XII

Mathematics(041)

ETB 14
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BOB
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Section - A

1. b b.p 4 ✓

2. b a.p 1 ✓

3. b c.p I - A ✓

4. b ~~a.p~~ I + c.p 1 ✓

5. b d.p 4 ✓

$$\begin{vmatrix} x & 3 & 4 \\ 1 & 2 & 1 \\ 1 & 4 & 1 \end{vmatrix} = x(2-4) - 3(1-1) + 4(4-2) \\
 = -2x + 8 = 0 \\
 2x = 8 \\
 \boxed{x = 4}$$

6. b c.p $2x^{2x} (1 + \log x)$

$$y = x^{2x} \rightarrow \log y = 2x \log x \quad \frac{1}{y} \frac{dy}{dx} = 2(\log x + x \cdot \frac{1}{x}) \\
 = 2x^{2x} (\log x + 1)$$

7.4 b.p $x = 1.5$

8.4 ~~b.p~~ d.p $-16x$

$$x = A \cos 4t + B \sin 4t$$

$$\frac{dx}{dt} = -4A \sin 4t + 4B \cos 4t$$

$$\frac{d^2x}{dt^2} = -16A \cos 4t - 16B \sin 4t$$

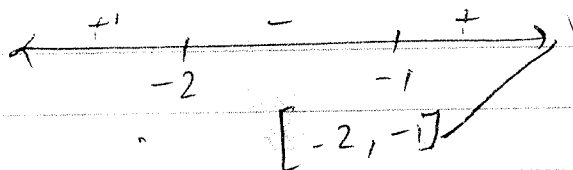
$$= -16(x)$$

9.4 b.p $(-2, -1)$

$$f'(x) = 6x^2 + 18x + 12 = 0$$

$$6(x^2 + 3x + 2) = 0$$

$$6(x+2)(x+1) = 0$$



$$x = A \cos 4t + B \sin 4t$$

$$\frac{dx}{dt} = -4A$$

$$x^2 + 3x + 2$$

$$x^2 + 2x + x + 2$$

$$(x+2)(x+1)$$

$$\int \frac{\sec^2 x}{1 + \tan^2 x} dx = \int \frac{\sec^2 x}{\sec^2 x} dx$$

$$\int \frac{1}{\cos x} dx = \int \frac{1}{\cos x} dx$$

$$\int \frac{1}{1 - \sin x} \cdot \frac{1 + \sin x}{1 + \sin x} dx$$

$$\int \frac{1 + \sin x}{\cos^2 x} dx$$

$$\int \sec^2 x + \int \sec x \tan x$$

$$= \tan x + \sec x + C$$

10.4 b.4 $\sec x + \tan x + C$

11.4 d.4 -2

12.4 b.4 3

$$3 \left(\frac{dy}{dx} \right)^2 \left(\frac{d^2y}{dx^2} \right)$$

13.4 b.4 $\frac{a_1}{b_1} = \frac{a_2}{b_2} = \frac{a_3}{b_3}$

14.4 c.4 7

15.4 a.4 $0, -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$

16.4 d.4 90°

$$-(x-2) \cdot \frac{-(x-2)}{x-2}$$

$$- \int -1 dx$$

$$- \int 1 dx = -[x]$$

$$= -[1 - (-1)]$$

$$= -[1+1] = -2$$

$$\sqrt{36+4+9} = 7$$

$$\frac{x}{\frac{1}{2}} = \frac{y}{\frac{1}{3}} = \frac{z}{-1}$$

$$\frac{x}{\frac{1}{6}} = \frac{y}{-1} = \frac{z}{-4}$$

$$= \frac{1}{2} \cdot \frac{1}{6} \cdot \frac{-1}{3} + \frac{4}{4}$$

$$= \frac{1}{12} - \frac{1}{3} + \frac{1}{4}$$

$$= \frac{1 - 4 + 3}{12} = \frac{0}{12} = 0$$

17.7 C.Y. ~~7~~
8 ✓

18.7 C.Y. 31
32 X

19.7 a.b Both are ~~true~~ and R is correct explanation of A

20.7 d.b A is false but R is true.

20.7 a.b Both ~~A & R~~ are ~~ca~~ and R is correct explanation of A

Section - B

21. $f(x) = \tan^{-1} x$

Domain = $R \setminus \{0\} \cup (-\infty, \infty)$, where, R = set of real numbers

Range = $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

22. $\lim_{x \rightarrow 0^-}$

o.k. LHL

$$\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} \frac{\sin^2 \lambda x}{x^2} = \lim_{h \rightarrow 0} \frac{\sin^2 \lambda(0-h)}{(0-h)^2}$$

$$= \lim_{h \rightarrow 0} \frac{\sin^2 \lambda h}{h^2} \times \frac{\lambda^2}{\lambda^2} = \lambda^2 \lim_{\lambda h \rightarrow 0} \left(\frac{\sin \lambda h}{\lambda h} \right)^2$$

$$= \lambda^2$$

RHL

$$\lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} \frac{\sin^2 \lambda x}{x^2} = \lim_{h \rightarrow 0} \frac{\sin^2 \lambda(0+h)}{(0+h)^2}$$

$$= \lim_{h \rightarrow 0} \frac{\sin^2 \lambda h}{h^2} \times \frac{\lambda^2}{\lambda^2} = \lambda^2 \lim_{h \rightarrow 0} \left(\frac{\sin \lambda h}{\lambda h} \right)^2$$

$$= \lambda^2$$

Now,

Put $x=0$, in $f(x) = 1$

As, $f(x)$ is continuous at $x=0$
 $\Rightarrow$ LHL = RHL = $f(0)$

$$\Rightarrow \lambda^2 = 1$$

$$\Rightarrow \boxed{\lambda = \pm 1}$$

$$\text{ans } \lambda = \pm 1$$

23.7

$$\frac{2x}{8} + \frac{y}{8} = \frac{8}{8}$$

$$y = 2$$

$$y = 4$$

$$\frac{x}{4} + \frac{y}{8} = 1$$

Point of intersection

$$x = \frac{1}{2}(8 - y)$$

$$2x + 2 = 8$$

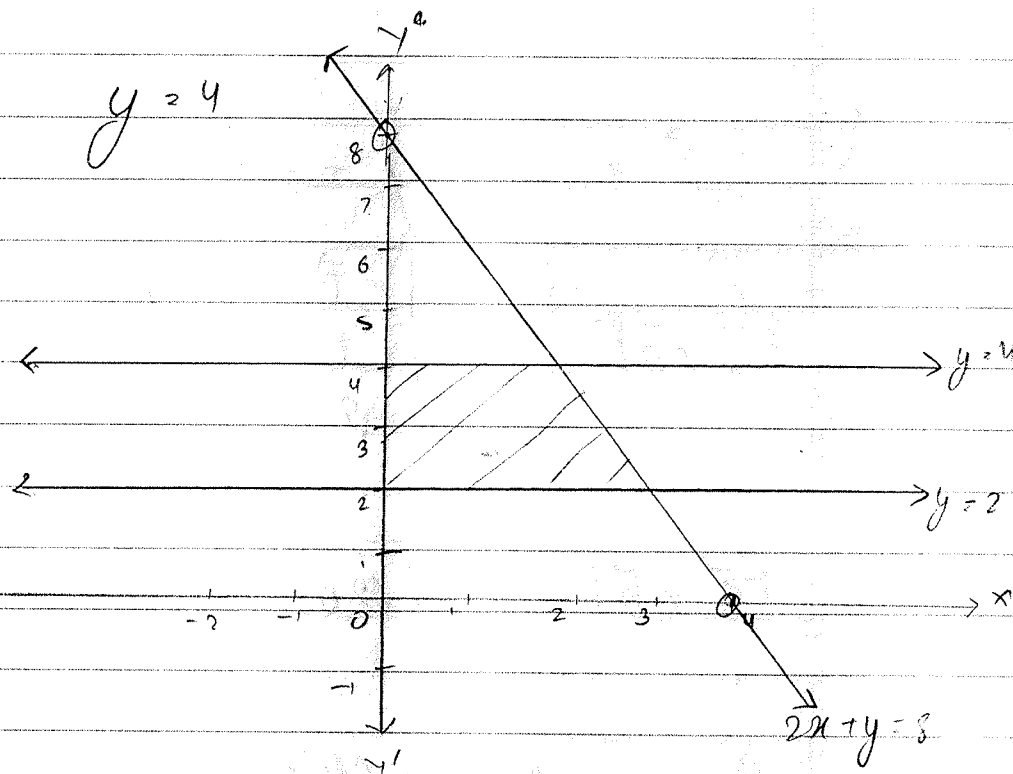
72-

Shaded
area

$$= \int_2^4 \frac{1}{2} (8 - y) dy$$

$$= \frac{1}{2} \left[8y - \frac{y^2}{2} \right]_2^4 = \frac{1}{2} \left[32 - 8 - (16 - 2) \right]$$

$$= \frac{1}{2} [24 - 14] = 5 \text{ sq units}$$

ans 5 sq. unit

24.4
D.P.

$$\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$$

$$\vec{b} = 2\hat{i} - 7\hat{j} + \hat{k}$$

$$\vec{a} \times \vec{b} = \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 1 & -1 & 3 \\ 2 & -7 & 1 \end{vmatrix} = \hat{i}(-1+21) - \hat{j}(1-6) + \hat{k}(-7+2)$$

$$= 20\hat{i} + 5\hat{j} - 5\hat{k}$$

$$|\vec{a} \times \vec{b}| = \sqrt{(20)^2 + (5)^2 + (-5)^2} = \sqrt{400 + 25 + 25} = \sqrt{450}$$

$$= 15\sqrt{2}$$

Area of parallelogram = $|\vec{a} \times \vec{b}| = 15\sqrt{2}$ sq. units

25.4

$$A(1, 2, -1)$$

$$5x - 25 = 14 - 7y = 35z$$

$$\frac{x-5}{\left(\frac{1}{5}\right)} = \frac{y-2}{\left(\frac{-1}{7}\right)} = \frac{z}{\left(\frac{1}{35}\right)}$$

Required line is

$$\vec{r} = (\hat{i} + 2\hat{j} - \hat{k}) + \lambda \left(\frac{1}{5}\hat{i} - \frac{1}{7}\hat{j} + \frac{1}{35}\hat{k} \right)$$

or $\vec{r} = (\hat{i} + 2\hat{j} - \hat{k}) + \lambda (7\hat{i} - 5\hat{j} + \hat{k})$

Cartesian equation:

$$\frac{x-1}{7} = \frac{y-2}{-5} = \frac{z+1}{1}$$

Section - C

26th

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

$$A^2 = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix} \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix} = \begin{bmatrix} 1+6+12 & 2-4+6 & 3+2+3 \\ 3-6+4 & 6+4+2 & 9-2+1 \\ 4+6+4 & 8-4+2 & 12+2+1 \end{bmatrix}$$

$$A^2 = \begin{bmatrix} 19 & 4 & 8 \\ 1 & 12 & 8 \\ 14 & 6 & 15 \end{bmatrix}$$

$$A^3 = A^2 \times A$$

$$A^3 = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix} \begin{bmatrix} 19 & 4 & 8 \\ 1 & 12 & 8 \\ 14 & 6 & 15 \end{bmatrix} = \begin{bmatrix} 19+2+42 & 4+24+18 & 8+16+45 \\ 57-2+14 & 12-24+6 & 24-16+15 \\ 76+2+14 & 12+24+6 & 32+16+15 \end{bmatrix}$$

$$A^3 = \begin{bmatrix} 63 & 46 & 69 \\ 69 & 0 & 23 \\ 92 & 54 & 63 \end{bmatrix}$$

$$A^3 = \begin{bmatrix} 63 & 46 & 69 \\ 69 & -6 & 23 \\ 92 & 46 & 63 \end{bmatrix}$$

LHS

$$= A^3 - 23A - 40I = \begin{bmatrix} 63 & 48 & 69 \\ 69 & 0 & 23 \\ 92 & 54 & 63 \end{bmatrix} - 23 \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix} - 40 \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

$$= \begin{bmatrix} 63 & 48 & 69 \\ 69 & 0 & 23 \\ 92 & 54 & 63 \end{bmatrix} - \begin{bmatrix} 23 & 46 & 69 \\ 69 & -46 & 23 \\ 92 & 46 & 23 \end{bmatrix}$$

LHS

$$= A^3 - 23A - 40I = \begin{bmatrix} 63 & 46 & 69 \\ 69 & -6 & 23 \\ 92 & 46 & 63 \end{bmatrix} - \begin{bmatrix} 23 & 46 & 69 \\ 69 & -46 & 23 \\ 92 & 46 & 23 \end{bmatrix} - \begin{bmatrix} 40 & 0 & 0 \\ 0 & 40 & 0 \\ 0 & 0 & 40 \end{bmatrix}$$

$$= \begin{bmatrix} 63 - 23 - 40 & 46 - 46 & 69 - 69 \\ 69 - 69 & -6 + 46 - 40 & 23 - 23 \\ 92 - 92 & 46 - 46 & 63 - 23 - 40 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$= 0 = RHS$$

Hence proved

27.4

Q.4

$$y = \tan x + \sec x$$

$$\frac{dy}{dx} = \sec^2 x + \sec x \tan x = \sec x (\sec x + \tan x)$$

$$\begin{aligned} \frac{d^2 y}{dx^2} &= \sec x \tan x (\sec x + \tan x) + \sec x (\sec x \tan x + \sec^2 x) \\ &= \sec^2 x \tan x + \sec x \tan^2 x + \sec^2 x \tan x + \sec^3 x \end{aligned}$$

27.6

Q.6

Let,

$$y = \sec^{-1} \left(\frac{1}{\sqrt{1-x^2}} \right)$$

$$\text{Let, } x = \sin \theta$$

$$y = \sec^{-1} \left(\frac{1}{\sqrt{1-\sin^2 \theta}} \right)$$

$$y = \sec^{-1} (\sec \theta)$$

$$t = \sin^{-1} (2x\sqrt{1-x^2})$$

$$\text{Let } x = \sin \theta$$

$$t = \sin^{-1} (2 \sin \theta \sqrt{1-\sin^2 \theta})$$

$$t = \sin^{-1} (\sin 2\theta)$$

$$y = \theta$$

$$y = \sin^{-1} x$$

$$\frac{dy}{dx} = \frac{1}{\sqrt{1-x^2}}$$

$$\frac{dy}{dt} = \frac{dy/dx}{dt/dx} = \frac{1}{\sqrt{1-x^2}} \cdot \frac{\sqrt{1-x^2}}{2} = \frac{1}{2}$$

$$t = 2\theta$$

$$t = 2 \sin^{-1} x$$

$$\frac{dt}{dx} = \frac{2}{\sqrt{1-x^2}}$$

ans $\frac{1}{2}$

28.16
Q.16

$$I = \int_0^{2\pi} \frac{1}{1 + e^{\sin x}} dx \quad \text{--- (1)}$$

$$I = \int_0^{2\pi} \frac{1}{1 + e^{\sin(2\pi-x)}} dx$$

$$\left\{ \because \int_0^a f(x) dx = \int_0^a f(a-x) dx \right\}$$

$$I = \int_0^{2\pi} \frac{1}{1 + e^{-8\sin x}} dx = \int_0^{2\pi} \frac{e^{8\sin x}}{1 + e^{8\sin x}} dx \quad \text{--- (I)}$$

(I) + (II)

$$2I = \int_0^{2\pi} \frac{1 + e^{8\sin x}}{1 + e^{8\sin x}} dx = \int_0^{2\pi} 1 dx$$

$$2I = [x]_0^{2\pi}$$

$$2I = 2\pi$$

$$I = \pi$$

ans π

29.4

$$y^2 \leq 2x$$

$$y^2 = 2x$$

$$y > x - 4$$

$$y = x - 4$$

$$x - y = 4$$

$$\frac{x}{4} + \frac{y}{-4} = 1$$

Point of intersection

$$y^2 = 2x$$

$$y = x - 4$$

$$x = y + 4$$

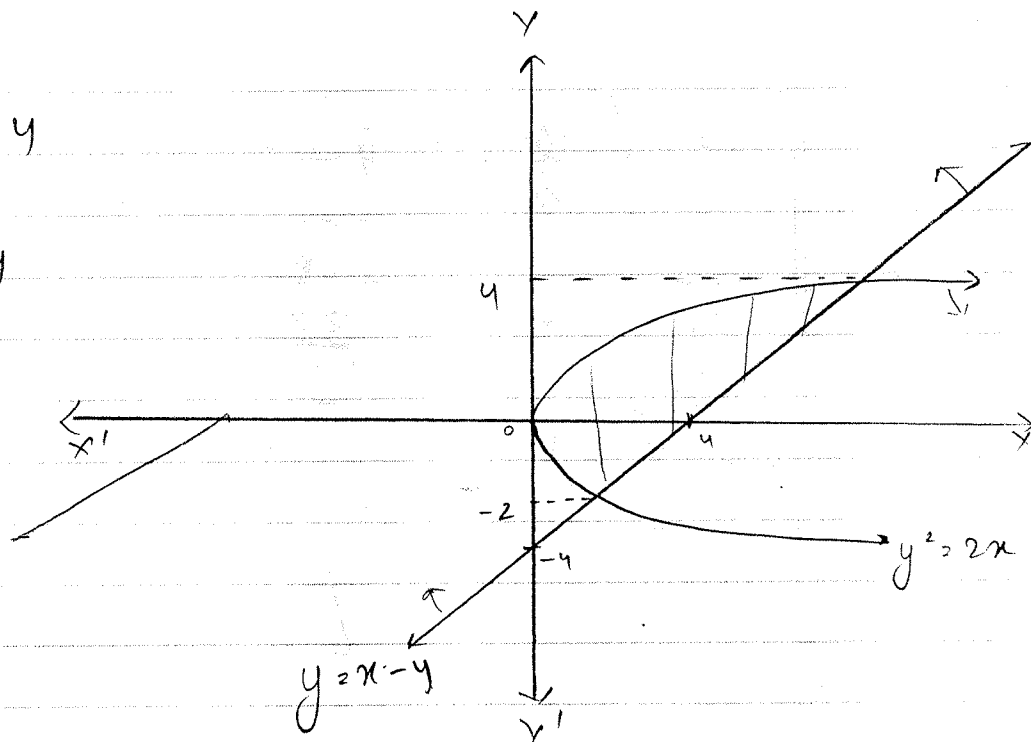
$$y^2 = 2(y + 4)$$

$$y^2 = 2y + 8 \Rightarrow y^2 - 2y - 8 = 0$$

$$(y - 4)(y + 2) = 0$$

$$y = -2, 4$$

$$\text{Required area} = \int_{-2}^4 (y + 4) dy - \int_{-2}^4 \frac{y^2}{2} dy$$



$$= \left[\frac{y^2}{2} - 4y - \frac{y^3}{6} \right]_{-2}^4$$

$$= \left[8 + 16 - \frac{32}{3} - \left(2 - 8 + \frac{4}{3} \right) \right]$$

$$= \left[24 - \frac{32}{3} + 6 - \frac{4}{3} \right] = \left[30 - \frac{36}{3} \right]$$

$$= \left[30 - 12 \right] = 18 \text{ sq unit}$$

ans 18 sq unit

30.4

b.p

Given, $|\vec{a}| = 3$ $|\vec{b}| = 4$ $|\vec{c}| = 2$

$$(\vec{a} + \vec{b} + \vec{c}) = \vec{0}$$

squaring,

$$(\vec{a} + \vec{b} + \vec{c})^2 = 0$$

$$\Rightarrow (\vec{a} + \vec{b} + \vec{c}) \cdot (\vec{a} + \vec{b} + \vec{c}) = 0$$

$$\Rightarrow \vec{a}^2 + \vec{b}^2 + \vec{c}^2 + \vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{a} \cdot \vec{c} + \vec{b} \cdot \vec{a} + \vec{c} \cdot \vec{b} + \vec{c} \cdot \vec{a} = 0$$

$$\vec{a}^2 + \vec{b}^2 + \vec{c}^2 + 2\{\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{a} \cdot \vec{c}\} = 0$$

$$|\vec{a}|^2 + |\vec{b}|^2 + |\vec{c}|^2 + 2(\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}) = 0$$

$$9 + 16 + 4 + 2(\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}) = 0$$

$$2\mu = -29$$

$$\mu = \frac{-29}{2}$$

$$\text{ans } \frac{-29}{2}$$

31.4 Given lines are parallel lines

$$\vec{a}_1 = \hat{i} + 2\hat{j} - 4\hat{k}$$

$$\vec{b} = (2\hat{i} + 3\hat{j} + 6\hat{k})$$

$$\vec{a}_2 = 3\hat{i} + 3\hat{j} - 5\hat{k}$$

$$d = \frac{|(\vec{a}_2 - \vec{a}_1) \times \vec{b}|}{|\vec{b}|}$$

$$\vec{a}_2 - \vec{a}_1 = 2\hat{i} + \hat{j} - \hat{k}$$

$$|\vec{b}| = \sqrt{4 + 9 + 36} = 7$$

$$\begin{array}{r} 196 \\ 81 \\ 16 \\ \hline 7 \overline{) 293} \\ 28 \\ \hline 13 \end{array}$$

distance between lines,

$$d = \frac{|(\vec{a}_2 - \vec{a}_1) \times \vec{b}|}{|\vec{b}|}$$

$$\begin{aligned} (\vec{a}_2 - \vec{a}_1) \times \vec{b} &= \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 1 & -1 \\ 2 & 3 & 6 \end{vmatrix} \\ &= \hat{i}(6 + 3) - \hat{j}(12 + 2) + \hat{k}(6 - 2) \\ &= 9\hat{i} - 14\hat{j} + 4\hat{k} \end{aligned}$$

$$|(\vec{a}_2 - \vec{a}_1) \times \vec{b}| = \sqrt{81 + 196 + 16} = \sqrt{293}$$

$$d = \frac{\sqrt{293}}{7} \text{ unit}$$

Section - D

32.

b. Let numbers be x & y

ATQ,

$$x + y = 5$$

$$\Rightarrow y = (5 - x)$$

then, sum of cubes,
let,

$$C = x^3 + y^3$$

$$\text{minimize } C = x^3 + (5 - x)^3$$

$$\frac{dC}{dx} = 3x^2 + 3(5 - x)^2(-1)$$

$$= 3x^2 - 3(5 - x)^2$$

$$= 3x^2 - 3(25 + x^2 - 10x)$$

$$\frac{dC}{dx} = 3x^2 - 75 - 3x^2 + 30x$$

$$\frac{75 + 5}{30 \times 2}$$

$$\frac{dC}{dx} = 30x - 75$$

Put

$$\frac{dC}{dx} = 0$$

$$30x - 75 = 0$$

$$x = \frac{75}{30} = \frac{5}{2}$$

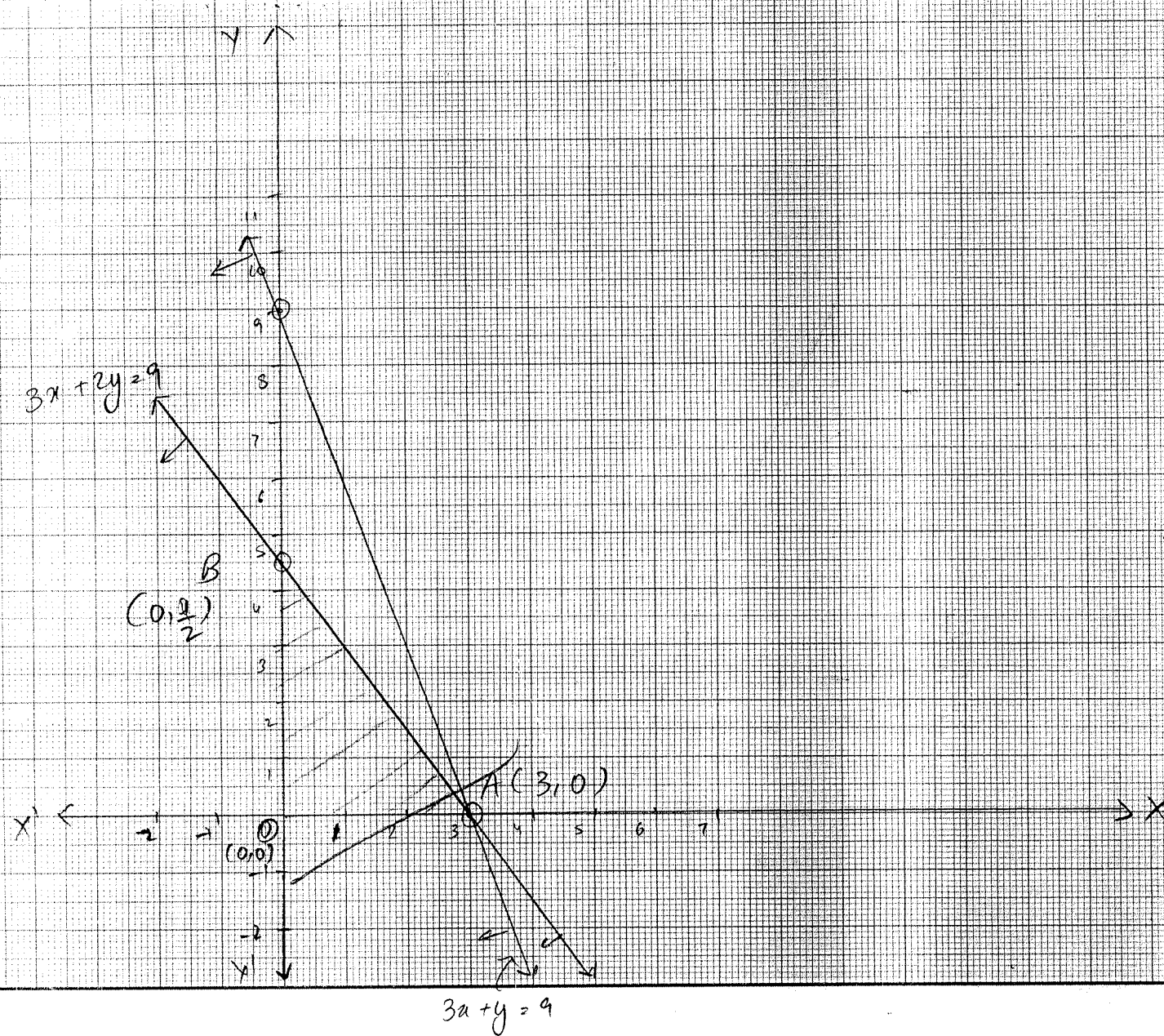
$$x = \frac{5}{2}$$

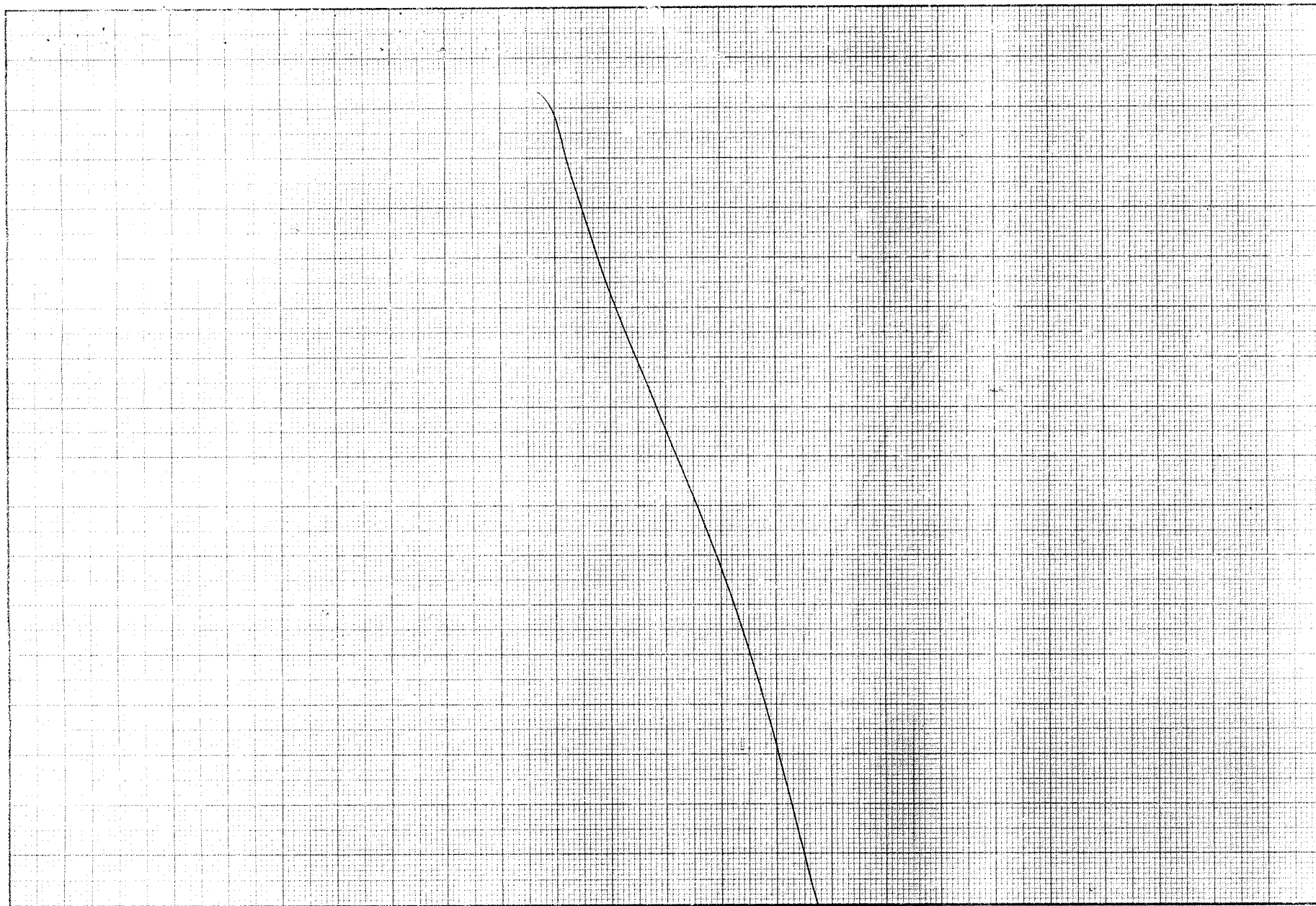
$$\frac{d^2C}{dx^2} = 30 > 0 \quad \frac{d^2C}{dx^2} \bigg|_{x = \frac{5}{2}} = 30 > 0$$

∴ Sum of cubes is least when $x = \frac{5}{2}$ & $y = \frac{5}{2}$

$$\therefore \text{Sum of squares} = x^2 + y^2 = \frac{25}{4} + \frac{25}{4} = \frac{25}{2}$$

$$\underline{\underline{\text{ans } \frac{25}{2}}}$$





33.7

$$I = \int_0^{\pi/2} \sin x \tan^{-1}(\sin x) dx = \int_0^{\pi/2} 2 \sin x \cos x \tan^{-1}(\sin x) dx$$

$$\text{let, } \sin x = t \quad \Rightarrow \quad dt = \cos x dx$$

$$I = 2 \int_0^1 t \tan^{-1}(t) dt$$

$$\text{let } I_1 = \int_0^1 t \tan^{-1} t dt$$

$$I_1 = \tan^{-1} t \cdot \frac{t^2}{2} - \frac{1}{2} \int \frac{t^2 + 1 - 1}{1 + t^2} dt = \frac{t^2}{2} \tan^{-1} t - \frac{1}{2} \left(1 - \frac{1}{1 + t^2} \right) dt$$

$$I_1 = \frac{t^2}{2} \tan^{-1} t - \frac{t}{2} + \frac{1}{2} \tan^{-1} t + C$$

$$I = 2 \left[\frac{t^2}{2} \tan^{-1} t - \frac{t}{2} + \frac{1}{2} \tan^{-1} t \right]_0^1$$

$$= 2 \left[\frac{1}{2} \tan^{-1}(1) - \frac{1}{2} + \frac{1}{2} \tan^{-1}(1) - \left(0 - 0 + \frac{1}{2} \tan^{-1}(0) \right) \right]$$

$$I = 2 \left(\frac{\pi}{8} - \frac{1}{2} + \frac{\pi}{8} \right) = 2 \left(\frac{\pi}{4} - \frac{1}{2} \right)$$

$$I = \frac{\pi}{2} - 1$$

$$\text{ans } \frac{\pi-2}{2} \quad \text{or} \quad \frac{1}{2}(\pi-2)$$

34.6

$$P = 70x + 40y$$

Subject to constraints

$$3x + 2y \leq 9$$

$$3x + y \leq 9$$

$$x \geq 0$$

$$y \geq 0$$

$$3x + 2y = 9$$

$$3x + y = 9$$

$$\frac{x}{3} + \frac{y}{\left(\frac{9}{2}\right)} = 1$$

$$\frac{x}{3} + \frac{y}{9} = 1$$

Corner points are $O(0,0)$, $A(3,0)$, $B(0, \frac{9}{2})$

Put $O(0,0)$ in $P = 70(0) + 40(0) = 0$

Put $A(3,0)$ in $P: P = 210 \leftarrow \text{Maximum}$

Put $B(0, \frac{9}{2})$ in $P: P = \cancel{180}$

$\therefore$ Maximum value of P is 210 at $\cancel{(3,0)}$

35% a.k. let,

E : He answered correctly

H_1 : He knows the answer

H_2 : He guesses the answer

$$P(H_1) = \frac{3}{5}$$

$$P(H_2) = \frac{2}{5}$$

$$P(E|H_1) = 1 \quad P(E|H_2) = \frac{1}{3}$$

From Bayes Theorem

$$P(H_1|E) = \frac{P(H_1) P(E|H_1)}{P(H_1) P(E|H_1) + P(H_2) P(E|H_2)}$$

$$P(H_1|E) = \frac{\frac{3 \times 1}{5}}{\frac{3 \times 1}{5} + \frac{2 \times 1}{3}} = \frac{3}{3 + \frac{2}{3}}$$

$$= \frac{3}{\frac{9+2}{3}}$$

$$P(H_1|E) = \frac{9}{11}$$

ans $\frac{9}{11}$

Section - E

Q. 1. Total possible relations from B to A = $2^{3 \times 2} = 2^6 = 64$

total functions from B to A = $2^3 = 8$

Ans

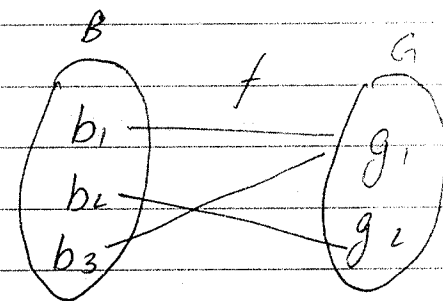
III → 2nd option

$$f = \{(b_1, g_1), (b_2, g_2), (b_3, g_1)\}$$

It is not bijective as

$$f(b_1) = g_1 \quad \& \quad f(b_3) = g_1$$

As $f(b_1) = f(b_3)$
through $b_1 \neq b_3$



∴ It is not one one as ~~for~~ b_1 & b_3 are related to same element g_1

As it is not one one, hence it is not bijective

37.4

9.4. let, cost of: 1 pen = ₹ x
 1 bag = ₹ y
 1 instrument box = ₹ z

then, ATO,

$$\begin{aligned} 3x + 5x + 3y + z &= 160 \\ 2x + y + 3z &= 190 \\ x + 2y + 4z &= 250 \end{aligned}$$

Given system of equations can be written as,

$$\underbrace{\begin{bmatrix} 5 & 3 & 1 \\ 2 & 1 & 3 \\ 1 & 2 & 4 \end{bmatrix}}_A \underbrace{\begin{bmatrix} x \\ y \\ z \end{bmatrix}}_X = \underbrace{\begin{bmatrix} 160 \\ 190 \\ 250 \end{bmatrix}}_B$$

$$A, \begin{bmatrix} 5 & 3 & 1 \\ 2 & 1 & 3 \\ 1 & 2 & 4 \end{bmatrix} \quad A X = B \quad X = \begin{bmatrix} x \\ y \\ z \end{bmatrix} \quad B = \begin{bmatrix} 160 \\ 190 \\ 250 \end{bmatrix}$$

ii-y

$$|A| = 5(4-6) - 3(8-3) + 1(4-1)$$

$$= -10 - 15 + 3$$

$$|A| = -22 \neq 0 \quad \therefore A^{-1} \text{ exists}$$

iii-y

$$A_{11} = -2$$

$$A_{21} = -10$$

$$A_{31} = 8$$

$$A_{12} = -5$$

$$A_{22} = 19$$

$$A_{32} = -13$$

$$A_{13} = 3$$

$$A_{23} = -7$$

$$A_{33} = -1$$

$$\text{adj}(A) = \begin{bmatrix} -2 & -5 & 3 \\ -10 & 19 & -7 \\ 8 & -13 & -1 \end{bmatrix}^T = \begin{bmatrix} -2 & -10 & 8 \\ -5 & 19 & -13 \\ 3 & -7 & -1 \end{bmatrix}$$

$$A^{-1} = \frac{1}{|A|} \text{adj}(A) = \frac{-1}{22} \begin{bmatrix} -2 & -10 & 8 \\ -5 & 19 & -13 \\ 3 & -7 & -1 \end{bmatrix}$$

$$A^{-1} = \frac{1}{22} \begin{bmatrix} 2 & 10 & -8 \\ 5 & -19 & 13 \\ -3 & 7 & 1 \end{bmatrix}$$

38.

I

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

$$2xy dy = -(x^2 - y^2) dx$$

$$\frac{dy}{dx} = \frac{-(x^2 - y^2)}{2xy} \quad \div \text{ Numerator \& Denominator by } x^2$$

$$\frac{dy}{dx} = \frac{-\left(1 - \left(\frac{y}{x}\right)^2\right)}{2\left(\frac{y}{x}\right)}$$

$$\frac{dy}{dx} = \frac{\left(\frac{y}{x}\right)^2 - 1}{2\left(\frac{y}{x}\right)} = g\left(\frac{y}{x}\right)$$

II. b

Let

$$v = \frac{y}{x}$$

 $\Rightarrow$

$$y = xv$$

$$\frac{dy}{dx} = x \frac{dv}{dx} + v$$

 $\Rightarrow$

$$v + x \frac{dv}{dx} = \frac{v^2 - 1}{2v}$$

$$x \frac{dv}{dx} = \frac{v^2 - 1}{2v} - v = \frac{v^2 - 1 - 2v^2}{2v}$$

$$x \frac{dv}{dx} = \frac{-1 - v^2}{2v} = -\frac{(v^2 + 1)}{2v}$$

$$\frac{2v}{v^2 + 1} dv = -\frac{1}{x} dx$$

Integrating both sides,

$$\log |v^2 + 1| = -\log |x| + \log |c|$$

$$\log |v^2 + 1| = \log \left| \frac{c}{x} \right|$$

$$V^2 + 1 = \frac{C}{\kappa}$$

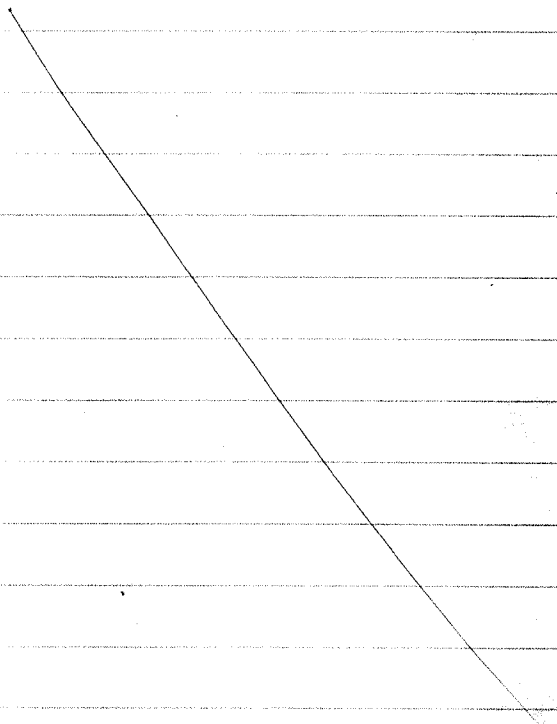
$$\frac{y^2}{x^2} + 1 = \frac{C}{\kappa}$$

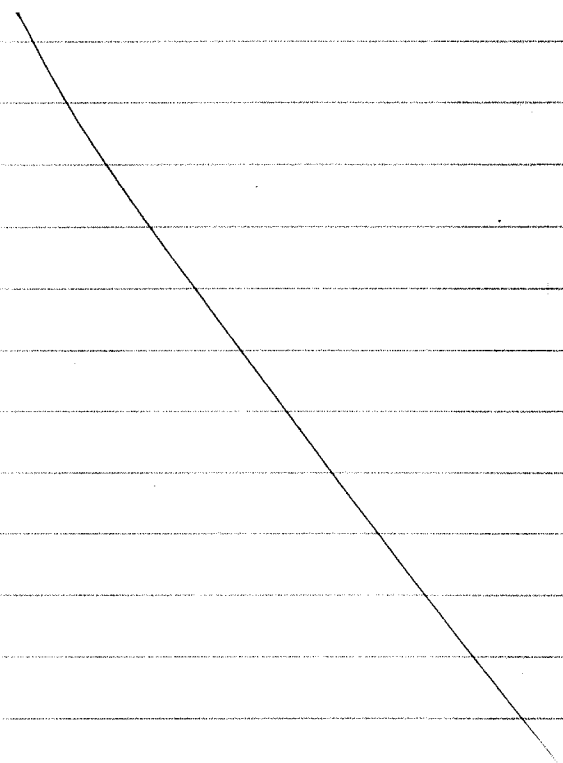
$$\frac{y^2}{x} + x = C$$

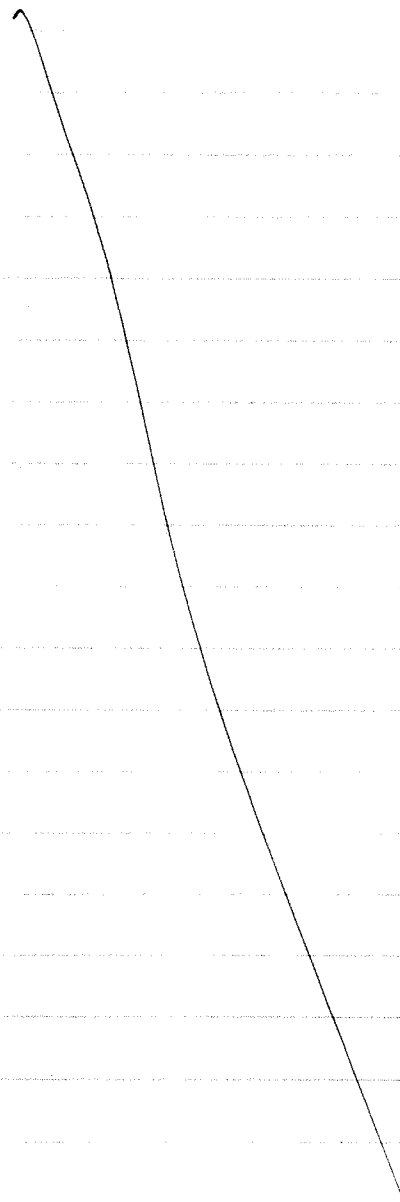
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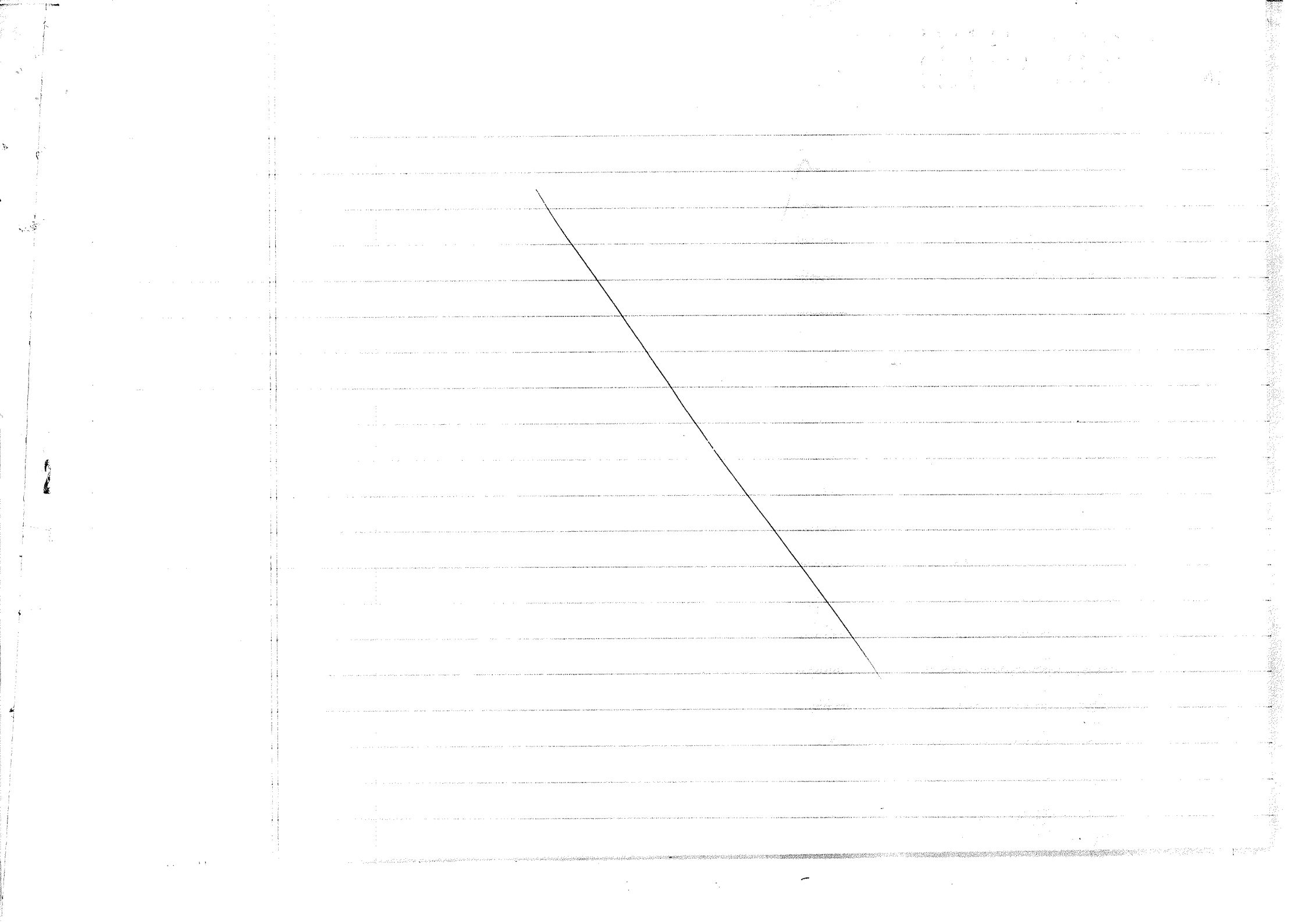
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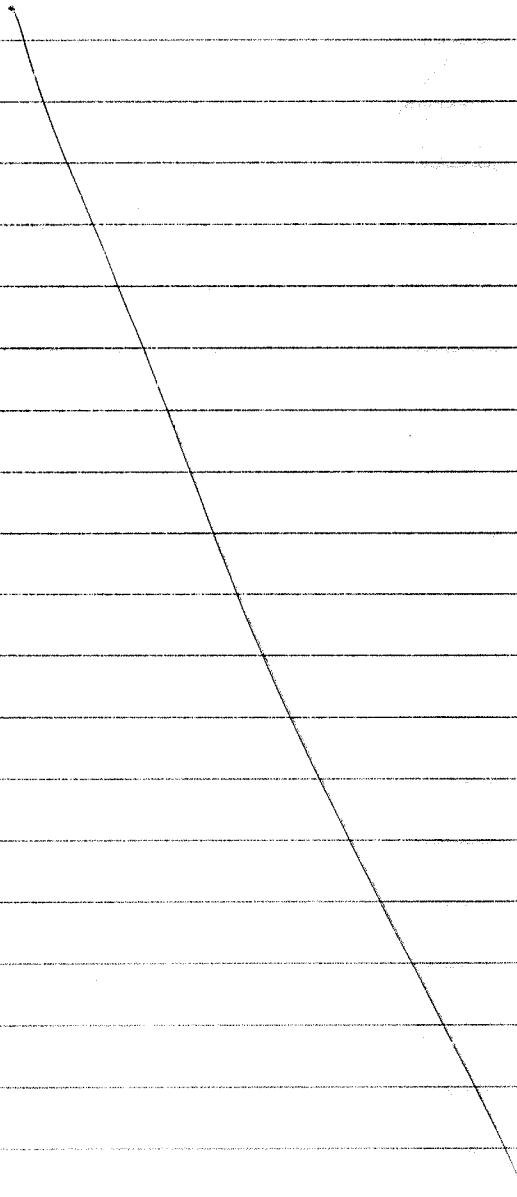
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1. The first part of the report is a general statement of the purpose of the study. It is to determine the effect of the new method of teaching on the students' understanding of the subject.

2. The second part of the report is a description of the method used. It is a comparison of the new method with the old method.

3. The third part of the report is a description of the results of the study. It is a comparison of the new method with the old method.

4. The fourth part of the report is a conclusion. It is a statement of the results of the study.

5. The fifth part of the report is a list of references. It is a list of the books and articles used in the study.

6. The sixth part of the report is a list of appendices. It is a list of the materials used in the study.

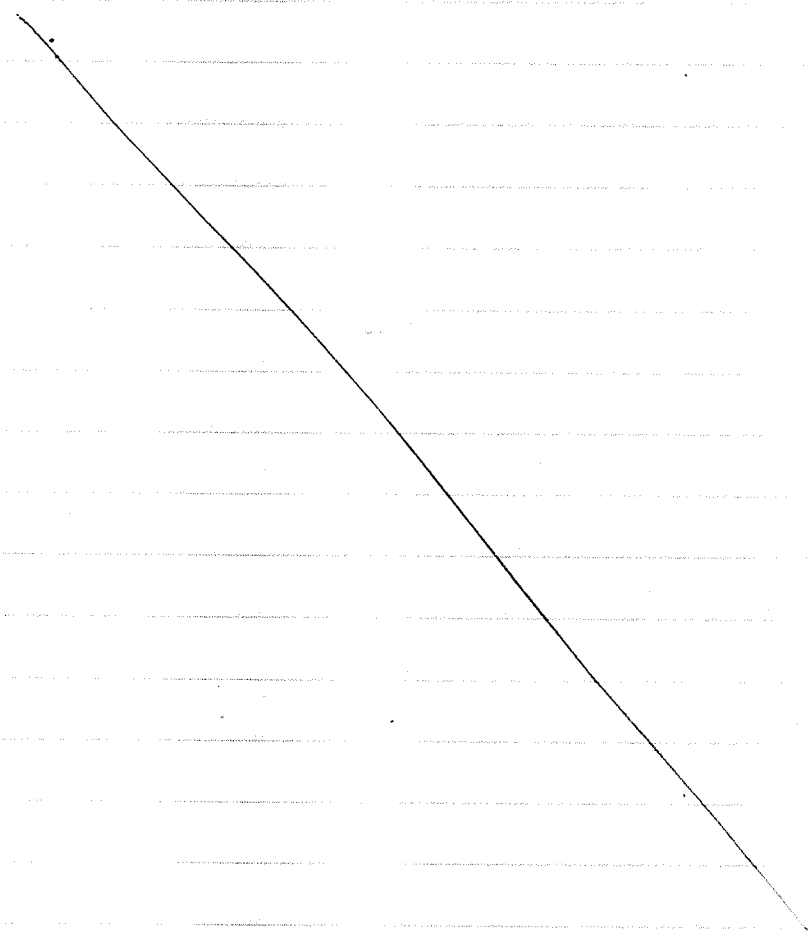
7. The seventh part of the report is a list of footnotes. It is a list of the notes used in the study.

8. The eighth part of the report is a list of tables. It is a list of the tables used in the study.

9. The ninth part of the report is a list of figures. It is a list of the figures used in the study.

10. The tenth part of the report is a list of symbols. It is a list of the symbols used in the study.

Handwritten notes at the top of the page, possibly a list or index.



1

Rough

$$\frac{x}{\frac{1}{2}} = \frac{y}{\frac{1}{3}} = \frac{z}{-1}$$

$$\frac{x}{\frac{1}{6}} = \frac{y}{-\frac{1}{4}} = \frac{z}{-\frac{1}{4}}$$

$$= \frac{1}{12} - \frac{1}{3} + \frac{1}{4} = \frac{1-4+3}{12} = 0$$

$$I = \int_1^8 \sqrt{10-(10-x)} = \int_2^8 \frac{\sqrt{x}}{\sqrt{10-x} + \sqrt{x}} dx$$

$$2I = \int_2^8 \frac{\sqrt{x} + \sqrt{10-x}}{\sqrt{x} + \sqrt{10-x}} dx = \int_2^8 1 dx = 8-2 = \frac{6}{2} = 3$$

$$\tan^{-1}(\sin x) - \frac{\cos 2x}{2}$$

$$+ \int \frac{\cos x \cdot \cos 2x}{1+\sin^2 x} dx$$

$$2 \sin x \cos x \tan^{-1} \sin x$$

$$2 \int_0^1 \frac{t \tan^{-1} t}{1+t^2} dt$$

$$\tan^{-1} t \left(\frac{1}{2} \right)$$

$$-\frac{1}{2} \int \frac{1}{1+t^2} dt$$

2023