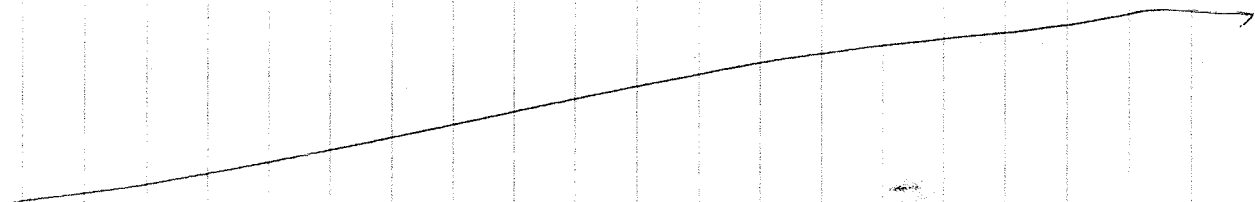


Class-XII

Mathematics(041)



177
MADRI
11/11/11

Section - A

1. b. y ✓

2. b. a. x 1 ✓

3. y C. y I - A ✓

4. y ~~4~~ + C. y 1 ✓

5. b. d. b. y ✓

$$\begin{array}{r|l} x & 3 & 4 \\ 1 & 2 & 1 \\ 1 & 4 & 1 \end{array} = \alpha(2-4) - 3(1-1) + 4(4-2) = -2\alpha + 8 = 0$$

$$2\alpha = 8 \Rightarrow \alpha = 4$$

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

$$y = x^{2x} \Rightarrow \log y = 2x \log x$$

$$\frac{d}{dx} \log y = 2 \log x + x \cdot \frac{1}{x}$$

$$= 2x^{2x} (\log x + 1)$$

7. y b.p $x = 1.5$

8. y ~~b.p~~ $x = -16x$

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

$0x = -4A \sin 4t + 4B \cos 4t$

or

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

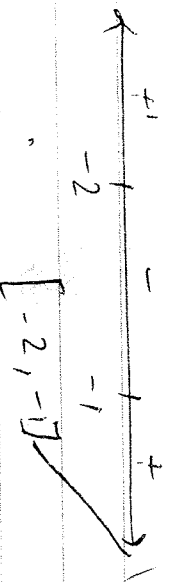
$= -16(x)$

9. y b.p $(-2, -1)$

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

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

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



$x = A \cos 4t + B \sin 4t$
 $0x = -4A$

$x^2 + 3x + 2$
 $x^2 + 2x + x + 2$
 $(x+2)(x+1)$

$\int \frac{3x^2 + 1}{(x+2)(x+1)} dx$
 $\int \frac{3x^2 + 1}{(x+2)(x+1)} dx = \frac{A}{x+2} + \frac{B}{x+1}$

$\int \frac{1}{(x+2)(x+1)} dx$

$\int \frac{1}{(x+2)(x+1)} dx = \frac{1}{x+2} - \frac{1}{x+1}$

$\int \frac{1}{(x+2)(x+1)} dx$

$\int 3x^2 dx + \int 1 dx$

$= x^3 + x + C$

10. $b \cdot x \quad x^2 + 1000x + c$

11. $d \cdot x - 2$

12. $b \cdot x^3$

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

13. $b \cdot x \quad \frac{Q_1}{b_1} = \frac{Q_2}{b_2} = \frac{Q_3}{b_3}$

14. $c \cdot y^7$

15. $a \cdot b \quad 0, -\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$

16. $d \cdot x \quad 90^\circ$

$-(x-1) \cdot - (x-2) \quad \frac{x-2}{x-1}$

$\int_{-1}^1 \frac{1}{x-1} dx$

$-\int_{-1}^1 dx = -[x]_{-1}^1$

$= -[1 - (-1)] = -2$

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

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

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

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

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

$\frac{1}{12} = \frac{-4 + 12}{12} = \frac{8}{12}$

$\frac{1}{12} = \frac{-4 + 12}{12} = \frac{8}{12}$

$\frac{1}{12} = \frac{-4 + 12}{12} = \frac{8}{12}$

$\frac{1}{12} = \frac{-4 + 12}{12} = \frac{8}{12}$

$\frac{1}{12} = \frac{-4 + 12}{12} = \frac{8}{12}$

17. $C \vee Z$
8 ✓

18. $C \vee 31$
32 X

19. A is Both are true and R is correct explanation of A

20. A is false but R is true.

20. Both A & R are true and R is correct explanation of A

Section - B

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

Domain = \mathbb{R} ~~is~~ $(-\infty, \infty)$, where, \mathbb{R} = set of real numbers

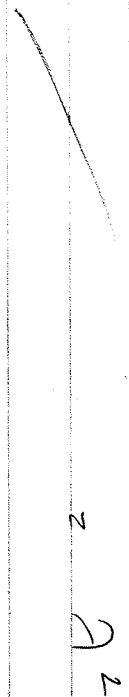
Range = $(-\frac{\pi}{2}, \frac{\pi}{2})$

22. $\lim_{x \rightarrow 0} \frac{\sin x}{x}$

0/0 L'H

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

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



$$\begin{aligned} \text{RHL} \lim_{x \rightarrow 0^+} f(x) &= \lim_{x \rightarrow 0^+} \frac{\sin^2 x}{x} = \lim_{x \rightarrow 0} \frac{\sin^2 x}{(0+x)^2} \\ &= \lim_{x \rightarrow 0} \frac{\sin^2 x}{x^2} \end{aligned}$$

$$\begin{aligned} &= \lim_{h \rightarrow 0} \frac{\sin^2 h}{h^2} \times \frac{h^2}{h^2} = h^2 \lim_{h \rightarrow 0} \left(\frac{\sin h}{h} \right)^2 \\ &= h^2 \cdot 1 \end{aligned}$$

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

As, $f(x)$ is continuous at $x=0$
 $\therefore \text{LHL} = \text{RHL} = f(0)$

$$\therefore x^2 = 1$$

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

ans $x = \pm 1$

Q3.4

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

$$y = 2$$

$$y = 4$$

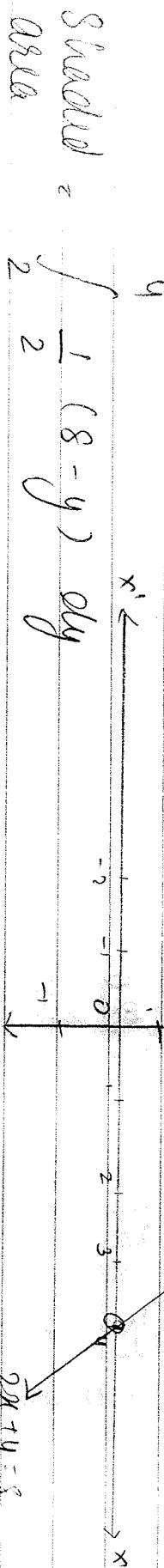
$$\frac{x+y}{4} = 1$$

Point of intersection

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

$$2x + y = 8$$

Area



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

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

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

89 units

~~ans 5 89 unit~~

2014
D.P.P

$$\vec{a} = \hat{i} - \hat{j} + 3\hat{k} \quad \vec{b} = 2\hat{i} - 7\hat{j} + \hat{k}$$

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

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

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

$$= 15\sqrt{2}$$

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

25.0

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

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

Required limit is

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

or $\vec{a} = (7\hat{i} + 2\hat{j} - \hat{k}) + \lambda (7\hat{i} - 5\hat{j} + 1\hat{k})$

Cartesian equation:

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

26.4

Section - C

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

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

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

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

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

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

LHS

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

$$= \begin{bmatrix} 63 & 48 & 69 \\ 69 & 0 & 23 \\ 92 & 54 & 63 \end{bmatrix} - \begin{bmatrix} 23 & 46 & 69 \\ 69 & -46 & 23 \\ 92 & 46 & 23 \end{bmatrix} - \begin{bmatrix} 40 & 0 & 0 \\ 0 & 40 & 0 \\ 0 & 0 & 40 \end{bmatrix}$$

RHS

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

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

∴ $O = RHS$
 Hence proved

27.5

for

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

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

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

$$= \sec^2 x \tan x + \sec x \tan^2 x + \sec^2 x \tan x + \sec^3 x$$

27.6

o.k

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

$$dy, \quad x = \sin \theta \quad dt = \sin^{-1} (2 \sin \theta \cos \theta)$$

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

$$y = \sec^{-1} (\sec \theta) \quad dt = \sin^{-1} (\sin 2\theta)$$

$$y = \theta$$

$$t = 2\theta$$

$$y = 8 \sin^{-1} x$$

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

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

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

~~$$\frac{dy}{dx} = \frac{dy}{dt} \frac{dt}{dx}$$~~

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

~~ans~~ $\frac{1}{2}$

Q8.16

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

①

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

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

$$I_2 = \int_0^{2\pi} \frac{1}{1 + e^{-8ix}} dx = \int_0^{2\pi} \frac{e^{8ix}}{1 + e^{8ix}} dx \quad \text{--- (11)}$$

(I) + (II)

$$2I_2 = \int_0^{2\pi} \frac{1 + e^{8ix}}{1 + e^{8ix}} dx = \int_0^{2\pi} 1 dx$$

$$2I_2 = [x]_0^{2\pi}$$

$$2I_2 = 2\pi$$

$$I_2 = \pi$$

ans π

29.4

$$y^2 \leq 2x$$

$$y \geq x - 4$$

$$y^2 = 2x$$

$$y = x - 4$$

$$x - y = 4$$

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

Point of intersection

$$y^2 = 2x$$

$$y = x - 4$$

$$x = y + 4$$

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

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

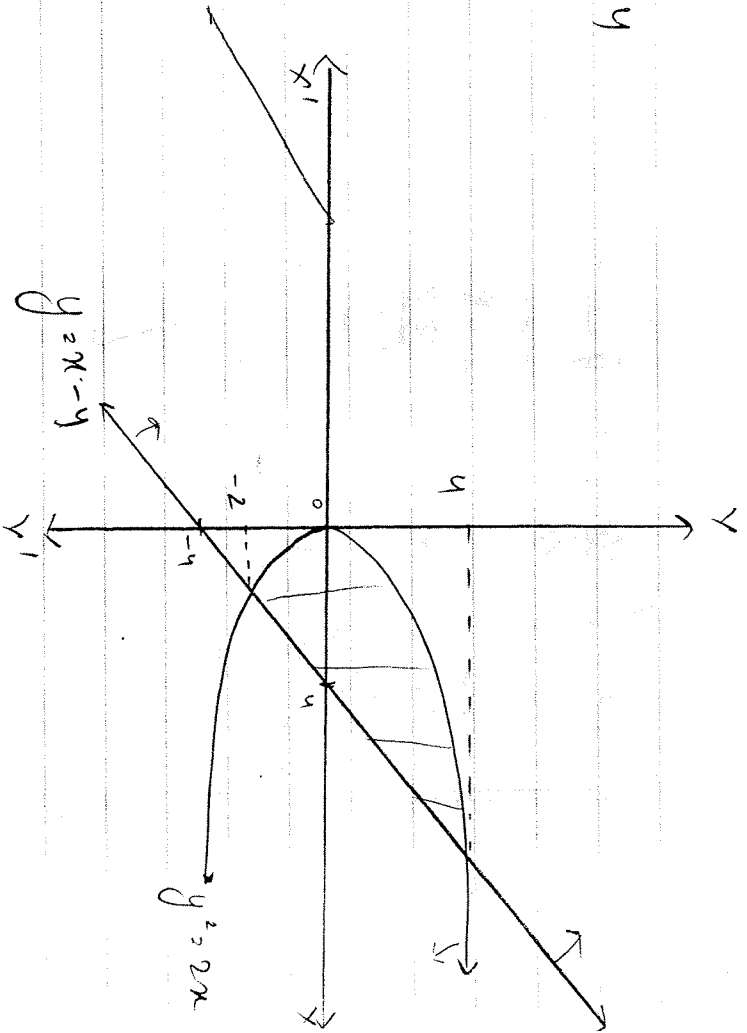
$$(y - 4)(y + 2) = 0$$

$$y = -2, 4$$

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

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

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

squaring,

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

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

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

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

$$1\vec{a}^2 + 1\vec{b}^2 + 1\vec{c}^2 + 2(\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}) = 0$$

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

$$2\mu = -29$$

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

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

31.4

Given lines are parallel lines

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

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

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

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

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

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

distance between lines,

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

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

$$= \hat{i}(6 + 3) - \hat{j}(12 + 2) + \hat{k}(6 - 2)$$

$$= 9\hat{i} - 14\hat{j} + 4\hat{k}$$

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

$$\begin{array}{r} 196 \\ 81 \\ \hline 277 \\ 28 \\ \hline 293 \end{array}$$

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

Section - D

32.4
b.s

Let numbers be x & y
A.T.O.,

then, sum of cubes,
let,

$$x + y = 5$$

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

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

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

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

$$= 3x^2 - 3(5 - x)^2$$
$$= 3x^2 - 3(25 + x^2 - 10x)$$

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

$$\frac{d^2C}{dx^2} = 30x - 75$$

$$\frac{75}{30} = 2.5$$

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

$$30x - 75 = 0$$

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

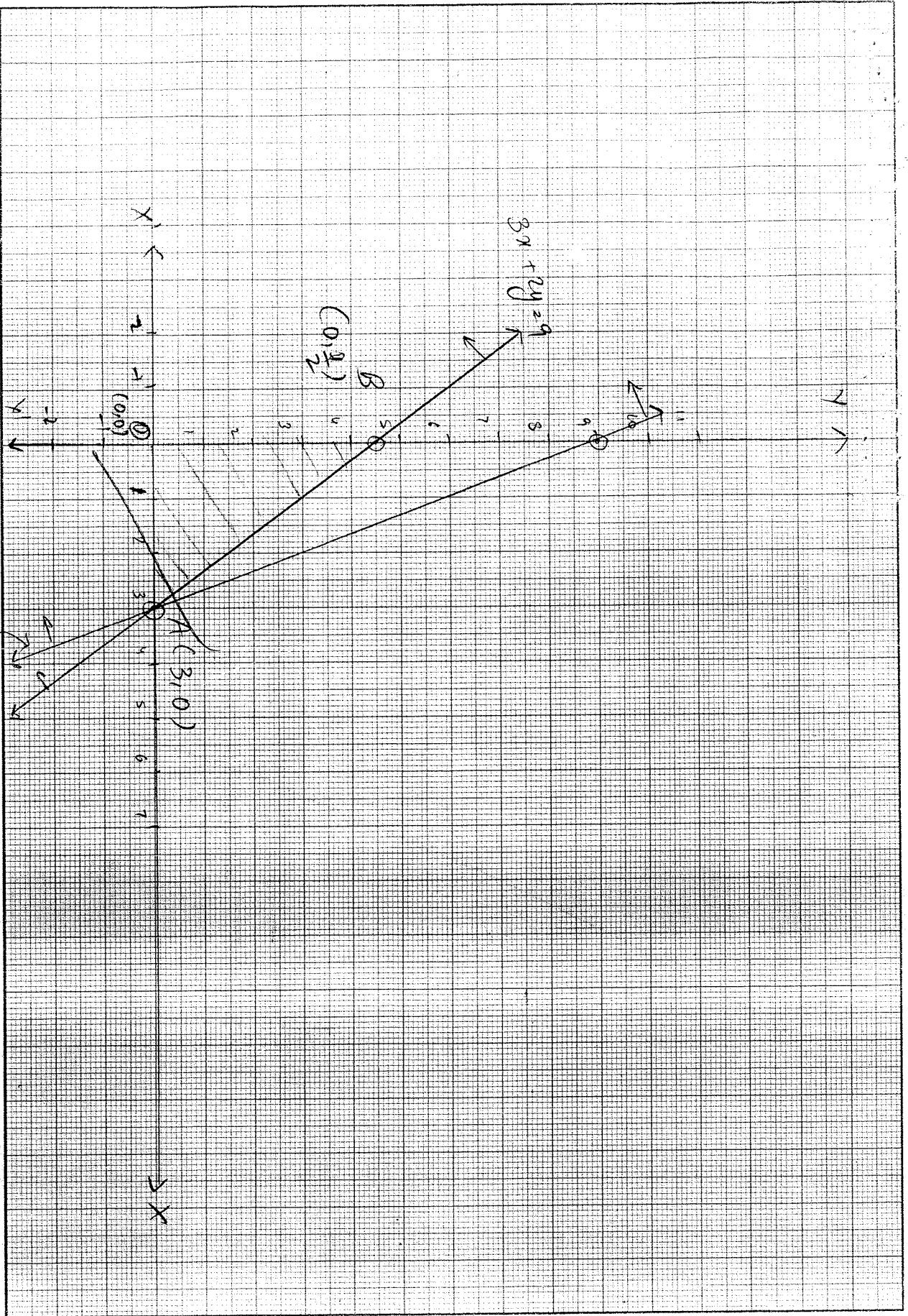
$$x = \frac{5}{2}$$

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

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

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

$$\frac{25}{2}$$



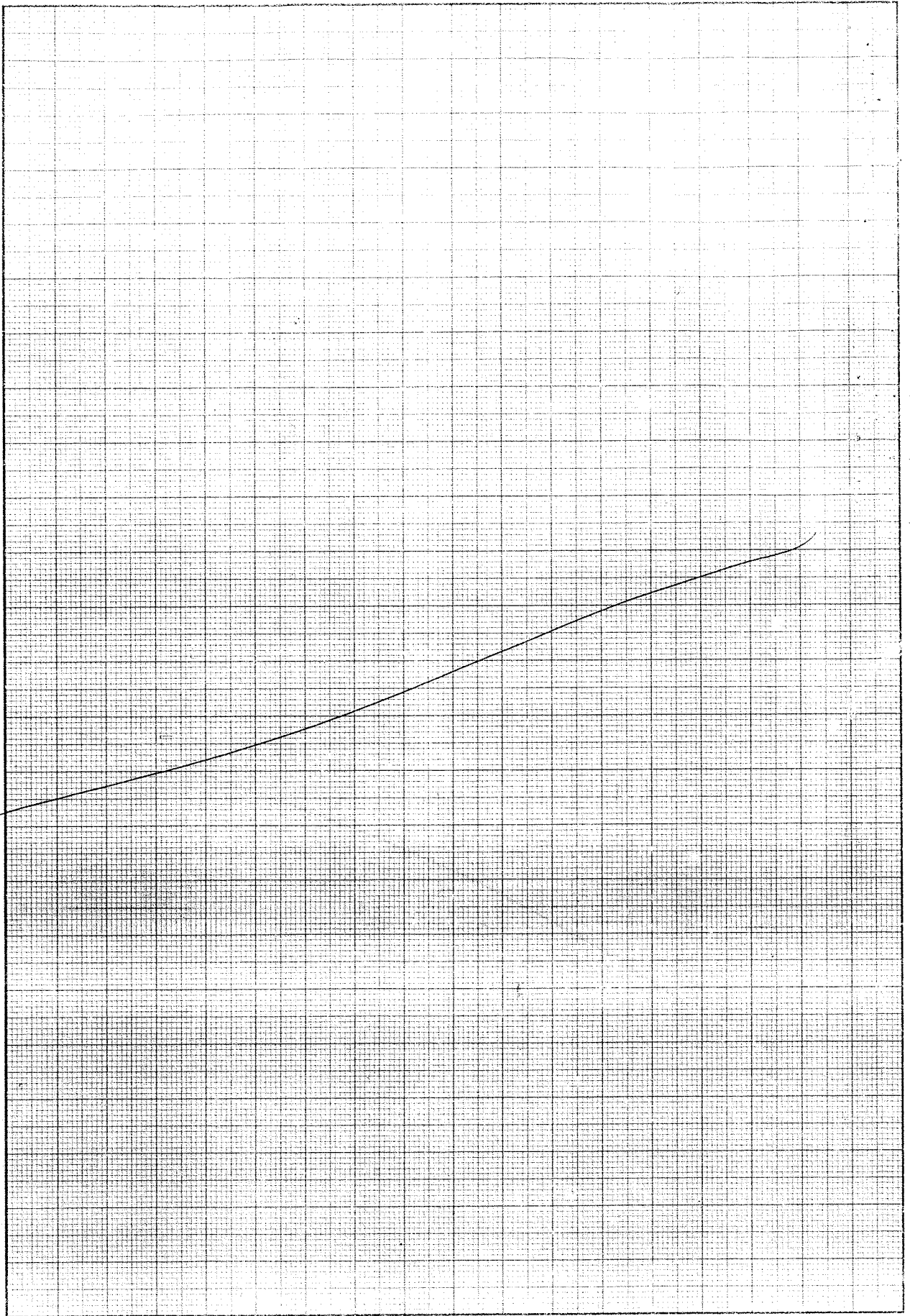
$$3x + 2y = 9$$

$B(0, \frac{9}{2})$

$A(3, 0)$

$O(0, 0)$

$$3x + y = 9$$



33.4

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

let, $\sin x = t \Rightarrow dt = \cos x dx$

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

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

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

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

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

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

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

$$I = \frac{x}{2} - 1 \quad \text{ans } \frac{x-2}{2}, \frac{1}{2}(x-2)$$

34.8

Subject to constraints

$$P = 70x + 40y$$

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

$$3x + y \leq 9$$

$$x \geq 0$$

$$y \geq 0$$

$$3x + 2y = 9$$

$$3x + y = 9$$

$$\frac{x}{3} + \frac{y}{2} = 1$$

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

Corner points are $O(0,0)$, $A(3,0)$, $B(0,9/2)$

Put D (0,0) in P = 70(0) + 40(0) = 0
 Put A (3,0) in P = 210 ← Maximum
 Put B (0, 3/2) in P = ~~180~~ 180

∴ Maximum value of P is 210 at (3,0)

35% a.k. let,

E : He answered correctly

M₁ : He knows the answers

M₂ : He guesses the answers

$$P(M_1) = \frac{3}{5}$$

$$P(M_2) = \frac{2}{5}$$

$$P(E|M_1) = 1$$

$$P(E|M_2) = \frac{1}{3}$$

from Bayes Theorem

$$P(M_1|E) = \frac{P(M_1) \cdot P(E|M_1)}{P(M_1) \cdot P(E|M_1) + P(M_2) \cdot P(E|M_2)}$$

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

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

$$P(M, E) = \frac{11}{9}$$

Section - E

Q. 4 T. & Total possible solutions from B to G = $2^{3 \times 2} = 2^6 = 64$

Other functions from B to G = $2^3 = 8$

III

III

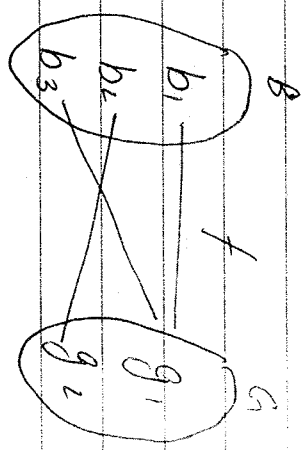
2nd option

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

It is not bijective as

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

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



∴ 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

37.5

Let, cost

of: 1 pen = ₹ x
1 bag = ₹ y

1 instrument box = ₹ z

₹ 160,

~~₹ 190~~ + 5x + 3y + z = 160

2x + y + 3z = 190

x + 2y + 4z = 250

Given system of equations can be written as,

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

$$AX = B$$

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

W.V

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

$$= -10 - 15 + 3$$

~~0~~ $\therefore A^{-1}$ exists

W.V

$$A_{11} = -2$$

$$A_{21} = -10$$

$$A_{31} = 8$$

$$A_{12} = -5$$

$$A_{22} = 19$$

$$A_{32} = -13$$

$$A_{13} = 3$$

$$A_{23} = -7$$

$$A_{33} = -1$$

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

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

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

38.5
I^x

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

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

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

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

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

II. b. ut

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

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

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

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

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

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

Integrating both sides,

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

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

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

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

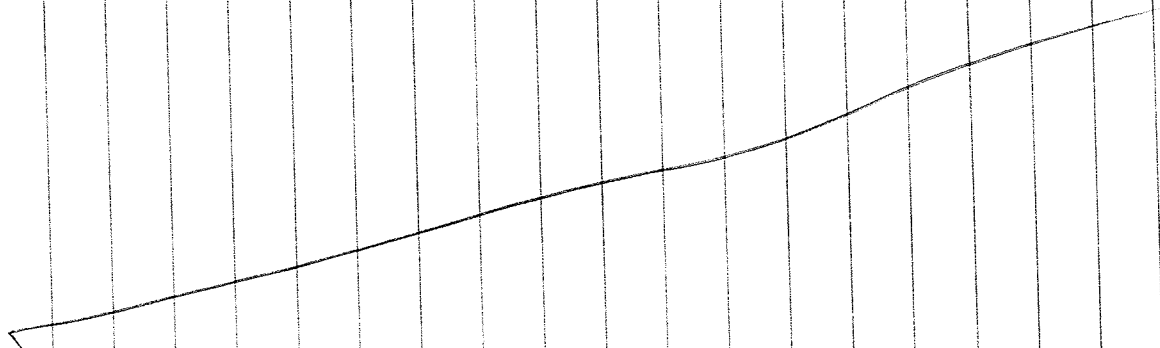
$$\frac{V^2}{R} + R = C$$

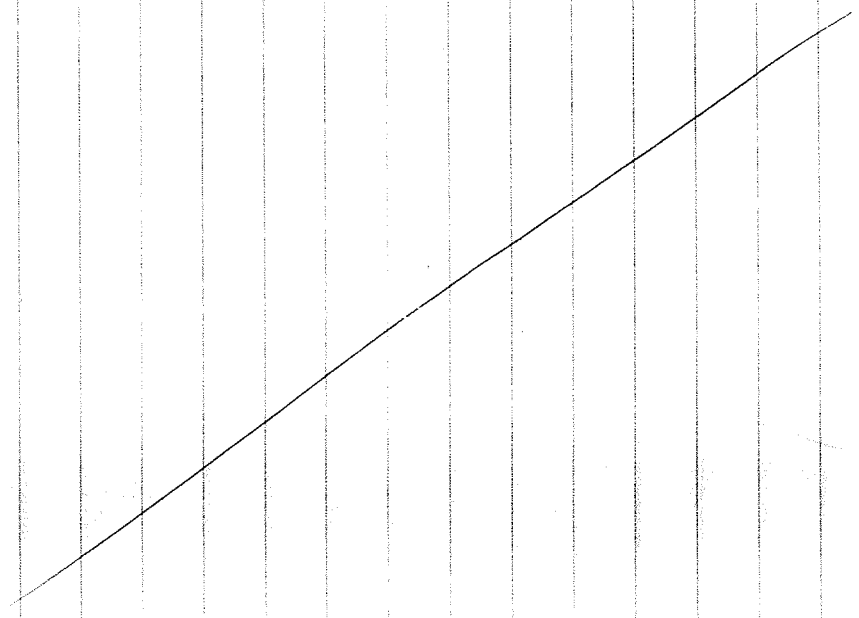
~~Dr. S. S. S. S. S.~~

~~Dr. S. S. S. S. S.~~

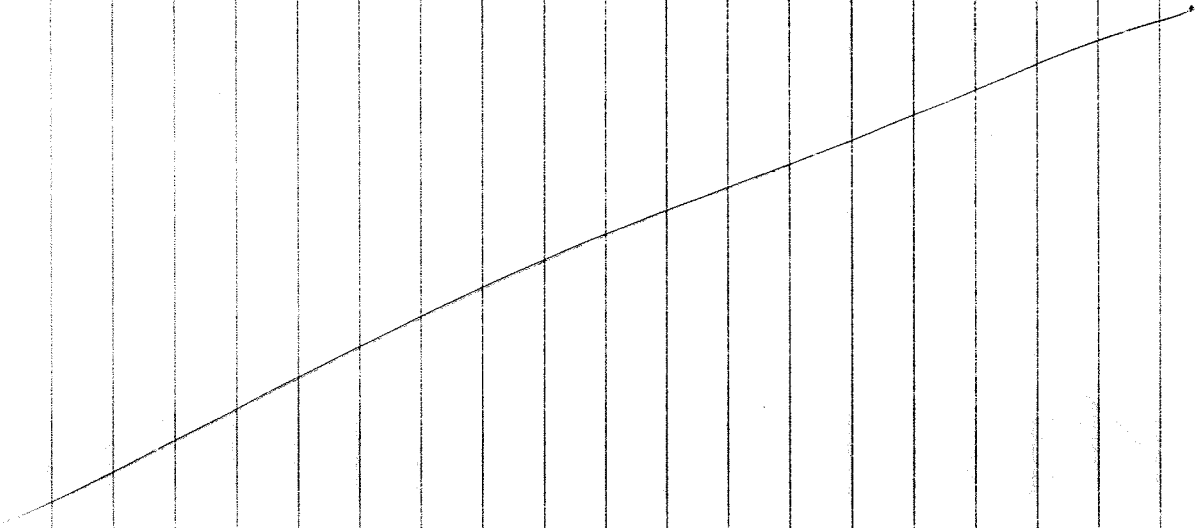
Dr. S. S. S. S. S.
(198205)

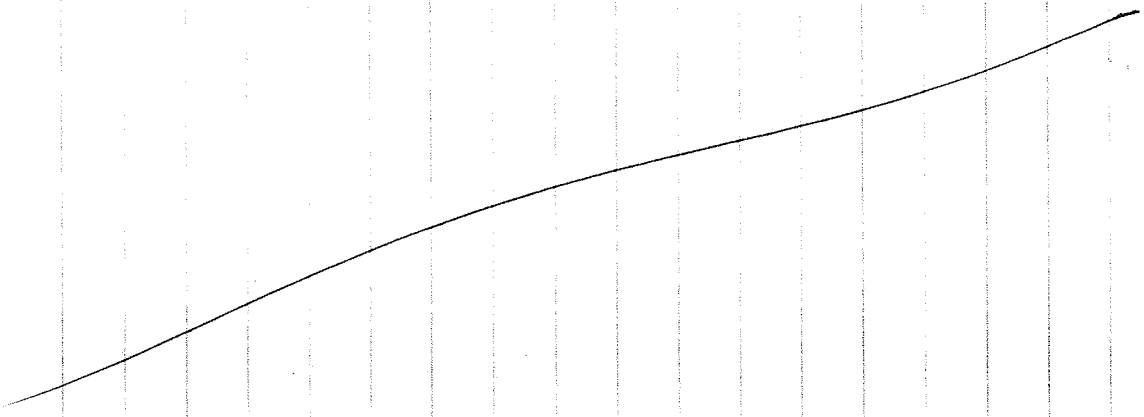
Handwritten notes or a list of numbers, possibly a sequence or data points, located in the upper left quadrant of the page.

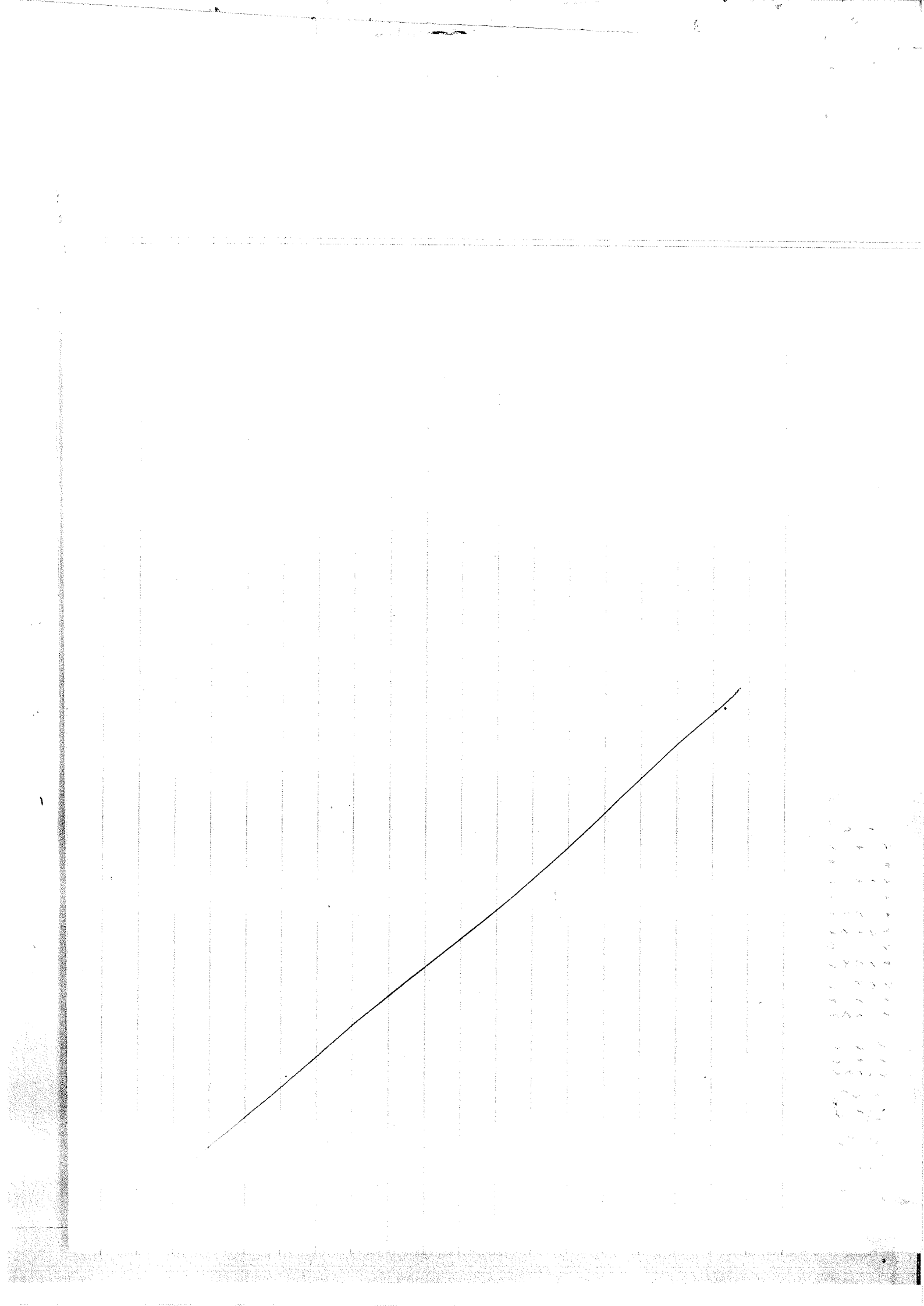




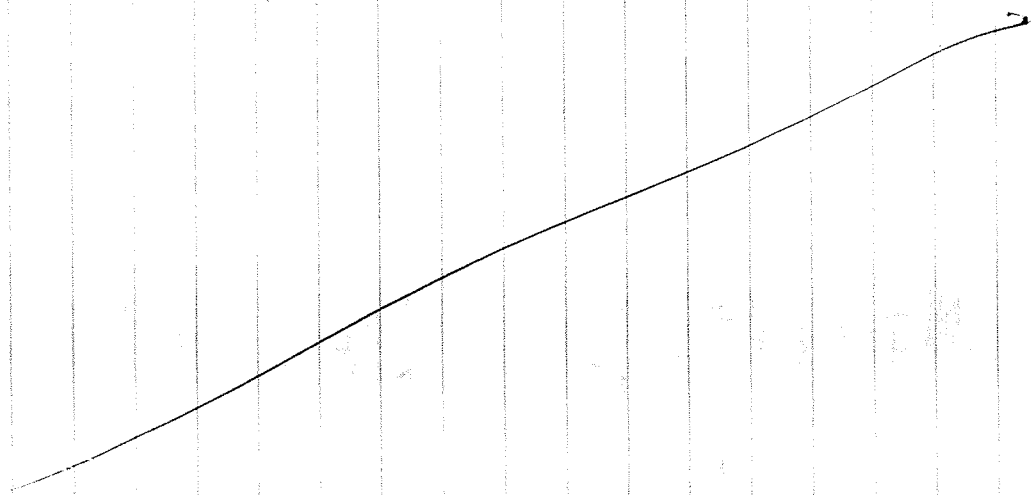
Handwritten text, possibly a signature or date, located in the bottom right corner of the page.







6 1 2 3 4 5



Rough

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

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

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

~~$$I = \int_8^8 \sqrt{10 - (10 - x)} = \int_8^8 \frac{\sqrt{x}}{\sqrt{10 - x} + \sqrt{x}} dx$$~~

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

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

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

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

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

$$\tan^{-1} t \Big|_0^1$$

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