

CLASSIC TEXTS SERIES

The Elements of
**COORDINATE
GEOMETRY**

Part 1
Cartesian Coordinates

SL LONEY

G. N. BERMAN

A Problem Book
in Mathematical
Analysis

→ XII
class



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PLANE TRIGONOMETRY

PART-I



S.L. LONEY

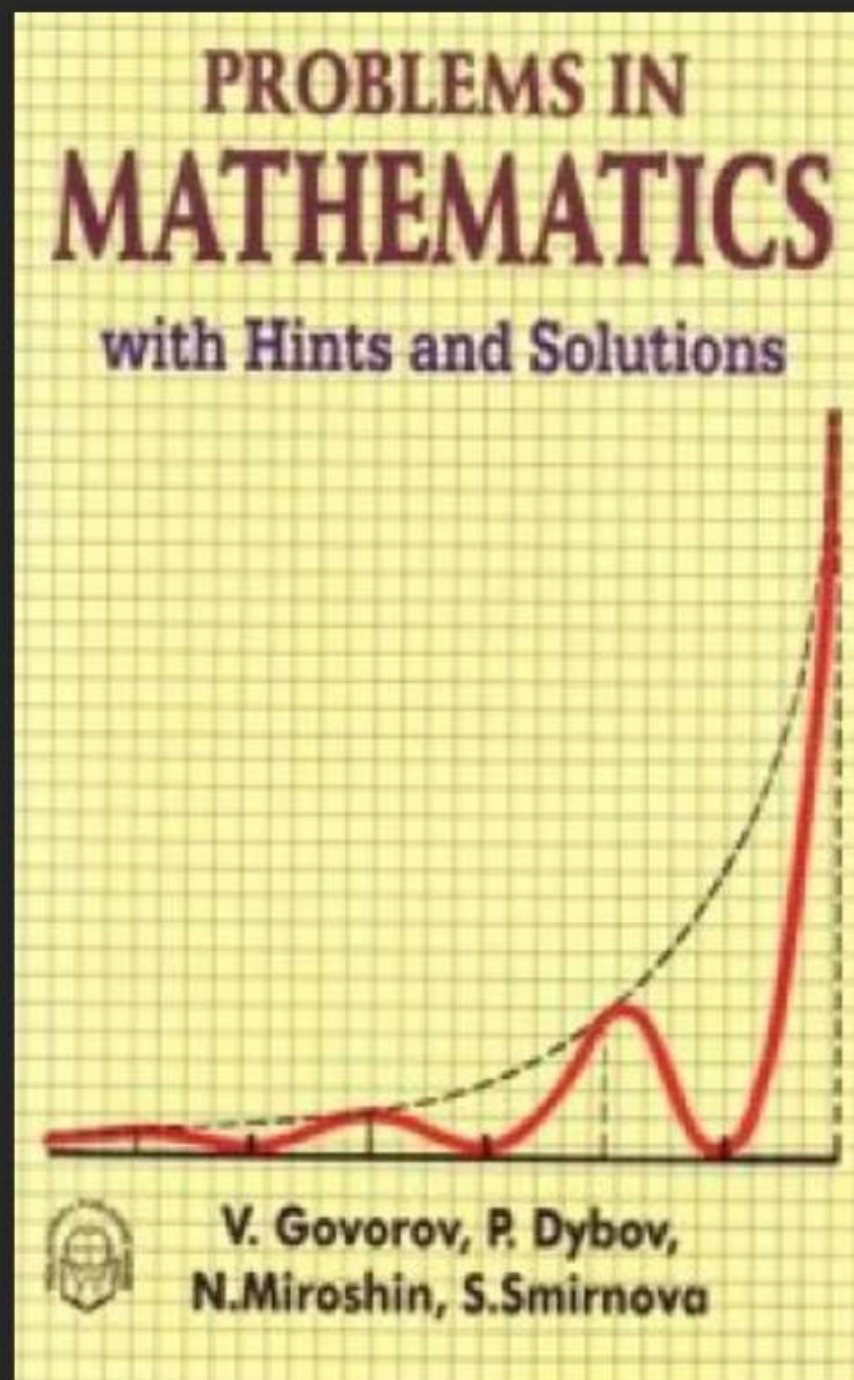
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HIGHER ALGEBRA

$$\begin{array}{r} 3x^2 + 5x^3 - 9x^4 \\ \hline 2x^4 + 4x^3 - 5x^2 \end{array}$$

H.S. HALL
S.R. KNIGHT

AITBS PUBLISHERS, INDIA



Sets
well defined collection of objects

$\{1, 2, 3, 4, \dots\}$

← Roster form

$\{x : x \in \mathbb{N}\}$

← Set builder form

$\{x \mid x \in \mathbb{N}\}$

$$\{x \mid x^2 = 4\}$$

$$\{-2, 2\}$$

$$\sqrt{4} = 2$$

$$\sqrt{x}$$

is non
negative

$\sqrt{-4}$ is non real

$$x \geq 0$$

Subset.

$$A \subset B$$

A is subset of B

B is superset of A

$a \in A$, then $a \in B$

$\times A = \{1, 2, 3\}$, $B = \{1, 2, 3, 5, 7\}$
 $\Rightarrow A \subset B$



Empty Set

Having no element

$$\{\emptyset\}$$

$$\{x \mid x \in \mathbb{R} \text{ and } x^2 = -9\} \\ = \{\emptyset\}$$

$$A = \{1, 2, 3\}$$

how many subsets of A are possible.
 $= 8$

$$\{\emptyset\}, \{1\}, \{2\}, \{3\}, \{1, 2\}, \{1, 3\}, \{2, 3\}, \{1, 2, 3\}$$

Union of sets

$$\underline{\text{Union of } A \text{ \& } B} = A \cup B \quad A \text{ or } B$$

↓
set of elements which belong to
A or B

$$A = \{1, 3, 5\}, B = \{1, 2, 3\} \Rightarrow A \cup B = \{1, 2, 3, 5\}$$

Intersection of sets

Intersection of A & B

$A \cap B$ = set of all elements which are common to A & B

and

$$A = \{1, 3, 5\}, \quad B = \{1, 2, 3\}$$

$$A \cap B = \{1, 3\}$$

Inequalities

 $x = ?$

$$(1) \quad x - 5 > 0$$

$$\Rightarrow x > 5 \quad \Rightarrow x \in (5, \infty)$$

$$(2) \quad 2x + 3 < 0 \quad \Rightarrow \boxed{x < -\frac{3}{2}}$$

$$\frac{2}{1} \left(x + \frac{3}{2} \right) < 0 \Rightarrow x + \frac{3}{2} < 0 \Rightarrow x - \left(-\frac{3}{2} \right) < 0 \Rightarrow x < -\frac{3}{2} \Rightarrow \boxed{x \in \left(-\infty, -\frac{3}{2} \right)}$$

$$a > b \Rightarrow a - b > 0$$

$$2a > 2b \Rightarrow 2(a - b) > 0$$

$$a > b \Rightarrow a + c > b + c$$

$$c < 0$$

$$a < b$$

$$a < b$$

$$a > b \Rightarrow$$

$$ca > cb$$

$$\vee c > 0$$

$$ca < cb$$

$$\vee c < 0$$

$$a > b$$

$$\Rightarrow a - b > 0$$

$$c < 0$$

$$c(a - b) < 0$$

$$ca < cb$$

not defined

$$\underline{(x-2)(x-3)} > 0 \implies \underline{x=1.9} \quad (1.9-2)(1.9-3) > 0$$

$$x < 2 \text{ or } x > 3$$

$$x=3.5$$

$$(3.5-2)(3.5-3) = 1.5 \times 0.5 > 0$$



$$(x-2)(x-3) > 0 \quad x-2 > 0 \quad x > 2$$

$$x \in (-\infty, 2) \cup (3, \infty)$$

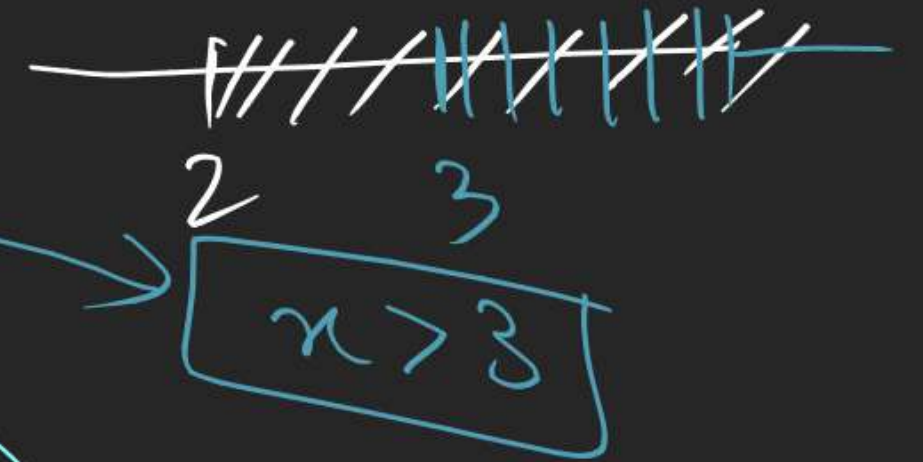
$$(x-2)(x-3) > 0$$

$$x \in (-\infty, 2) \cup (3, \infty)$$

$$x-2 > 0 \text{ \& } x-3 > 0$$

$$\boxed{x > 2} \text{ \& } \boxed{x > 3}$$

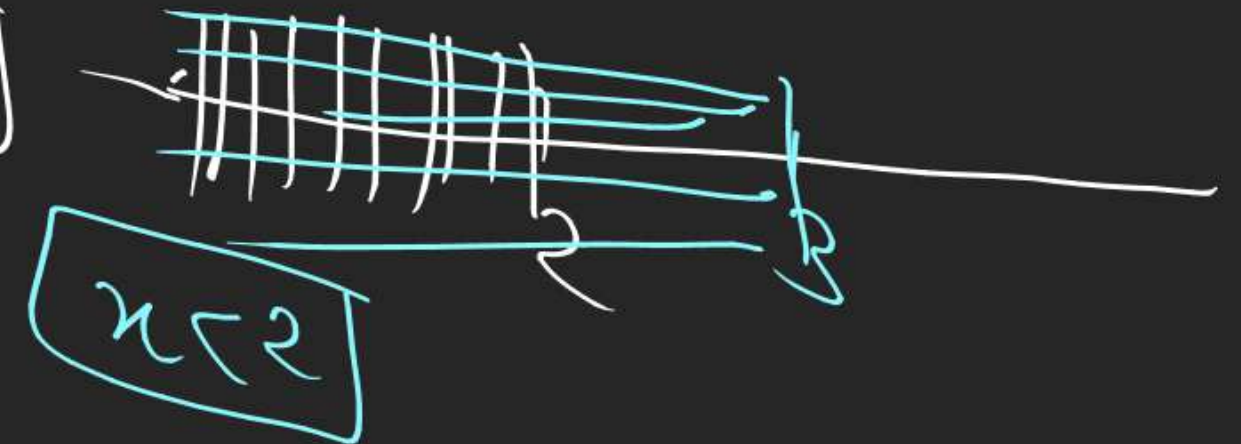
or



$$x-2 < 0 \text{ \& } x-3 < 0$$

$$\boxed{x < 2} \text{ \& } \boxed{x < 3}$$

$$\boxed{x < 2}$$



$$(x+2)(x-3)(x-1) < 0 \quad x=?$$

$$x < -2 \text{ or } 1 < x < 3$$

| | | | | |
|-------------------|---|---|---|---|
| $x+2$ | - | + | + | + |
| $x-1$ | - | - | + | + |
| $x-3$ | - | - | - | + |
| $(x+2)(x-1)(x-3)$ | - | + | - | + |

$$x \in (-\infty, -2) \cup (1, 3)$$

$$(x+2)(x-1)(x-3) < 0$$



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



$$(x+7)(2x-1)(3x+5)(x-2) \leq 0$$

$x = ?$

$$x \in \left[-7, -\frac{5}{3}\right] \cup \left[\frac{1}{2}, 2\right] \Rightarrow \underline{Ans}$$

