

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

Inequalities

Basic of Inequality

Inequalities involving
linear factor

Quadratic factor

Polynomial factor

$$\log_3 x = \frac{1}{2} - \text{equation}$$
$$(x^2 + 1)(x - 1)$$

Logarithmic in

$$\log_3 x >$$

inequality

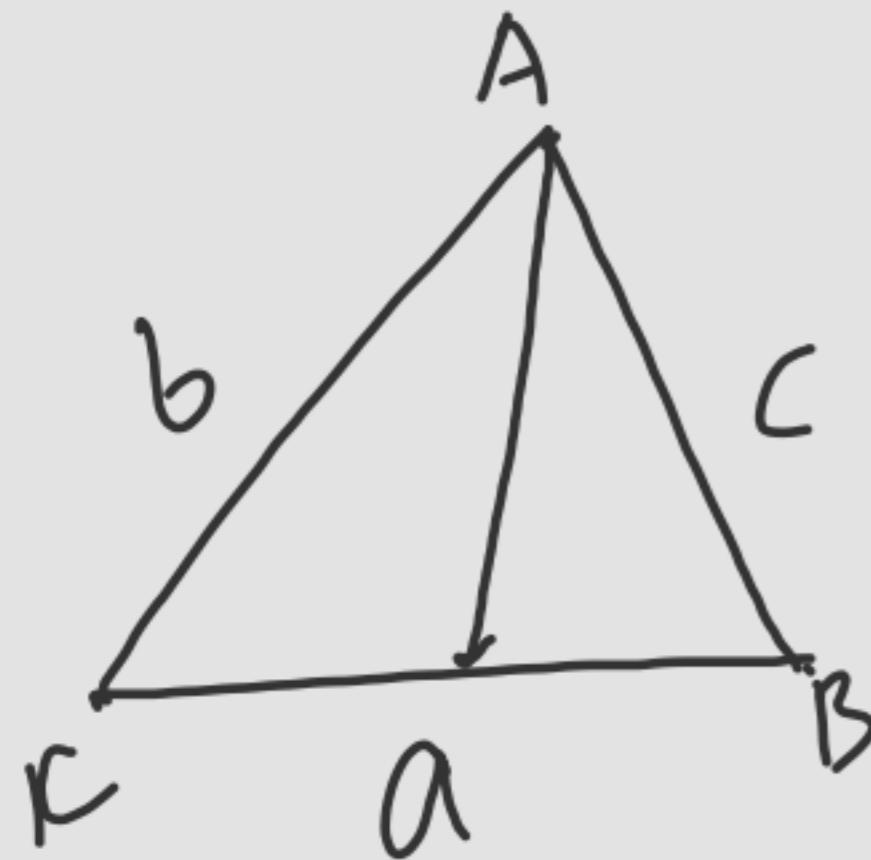
Trigonometric in

$$\sin x > \frac{1}{2}$$

Inverse trigono

$$\sin^{-1} \frac{1}{2} > x$$

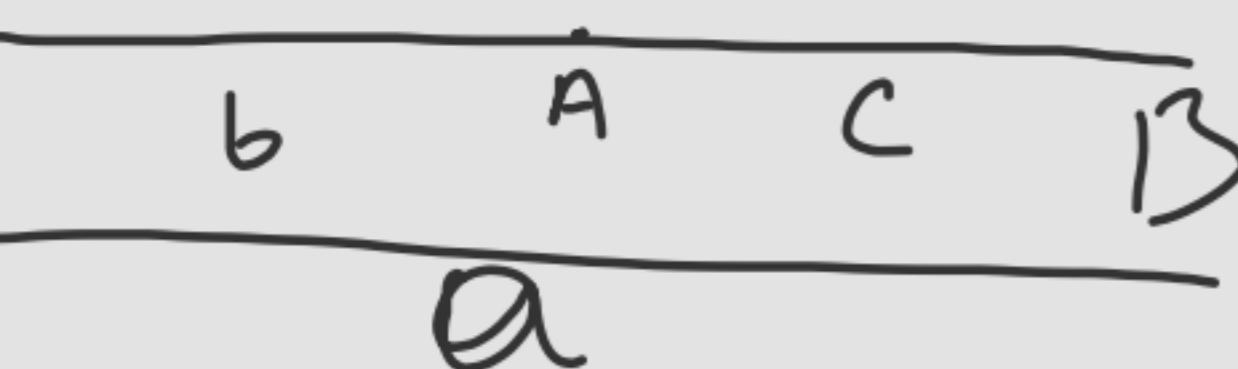
Triangular inequality



$$b + c \geq a$$

$$a + c \geq b$$

$$a + b \geq c$$



$$\underline{b + c = a}$$

R.M.S.-AM-GM inequality

Cauchy-Swartz inq

Chebyshar inq

Holder's minskows inq

RMO, IMO
SFO

Intervals

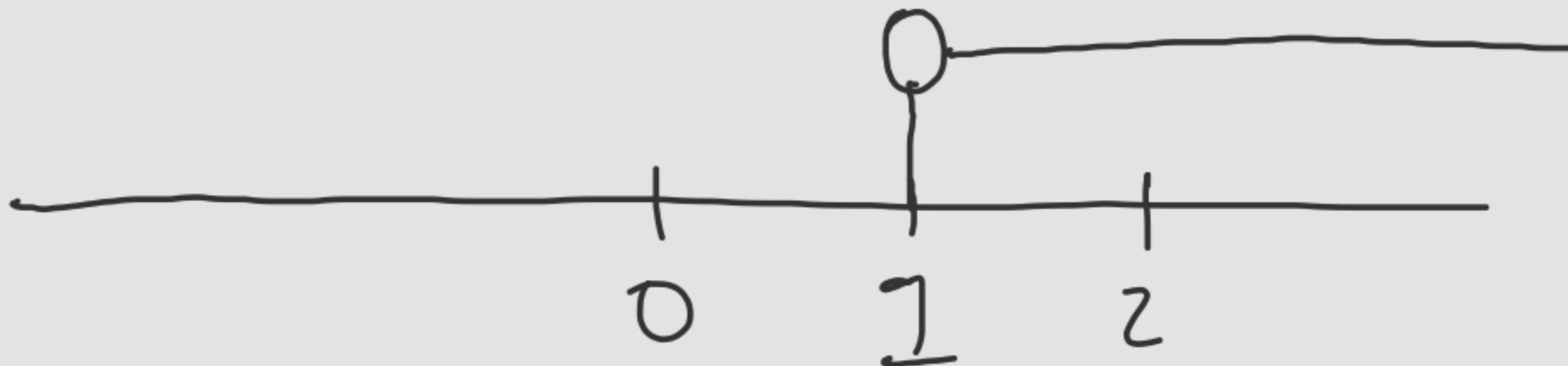
$$x+4 = 5 \Rightarrow x = +1$$

$$x+4 > 5 \Rightarrow x > 1$$

$$x > 5$$

$$x = 5 \quad 0 \rightarrow \infty$$

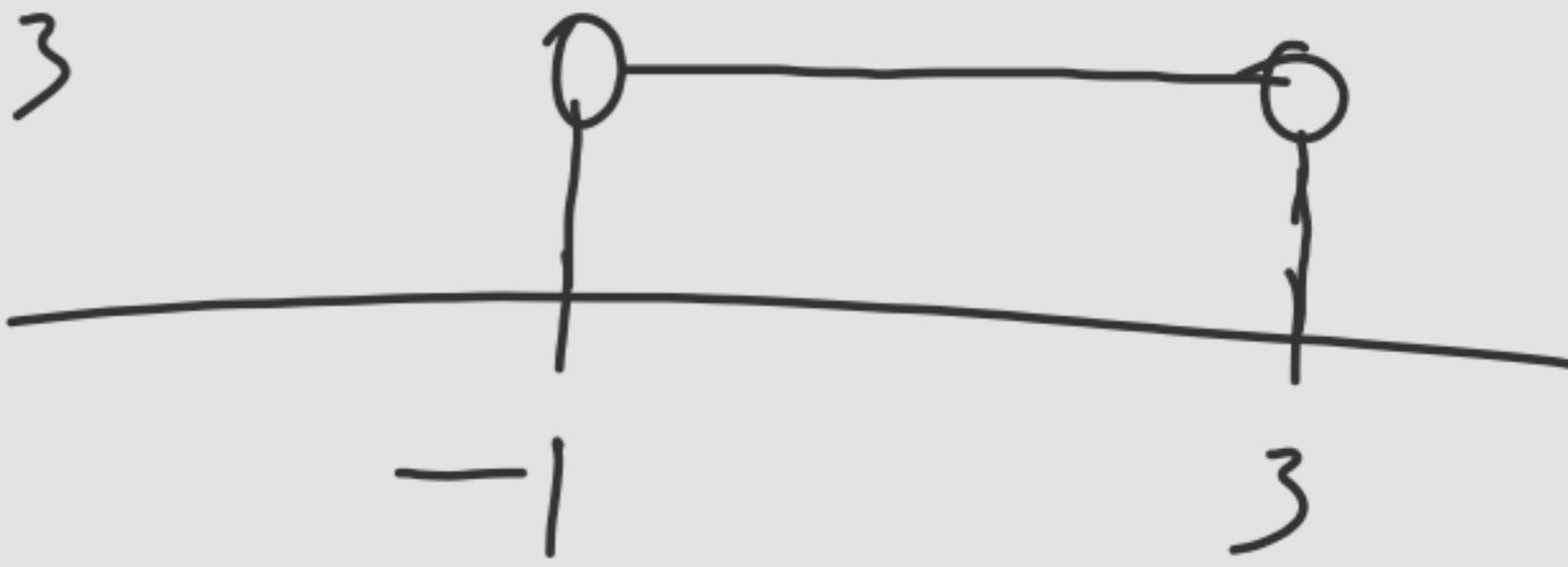
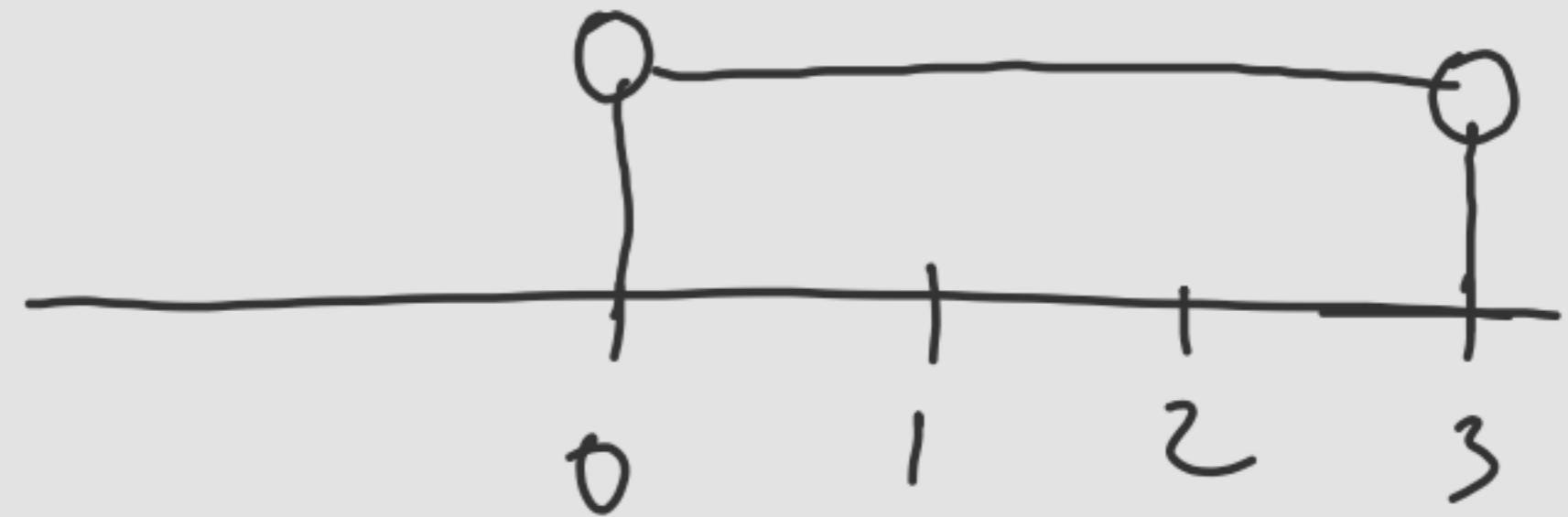
$$x = -1$$



→ Open intervals

$(0, 3)$ → all the no
• b/w 0 to 3

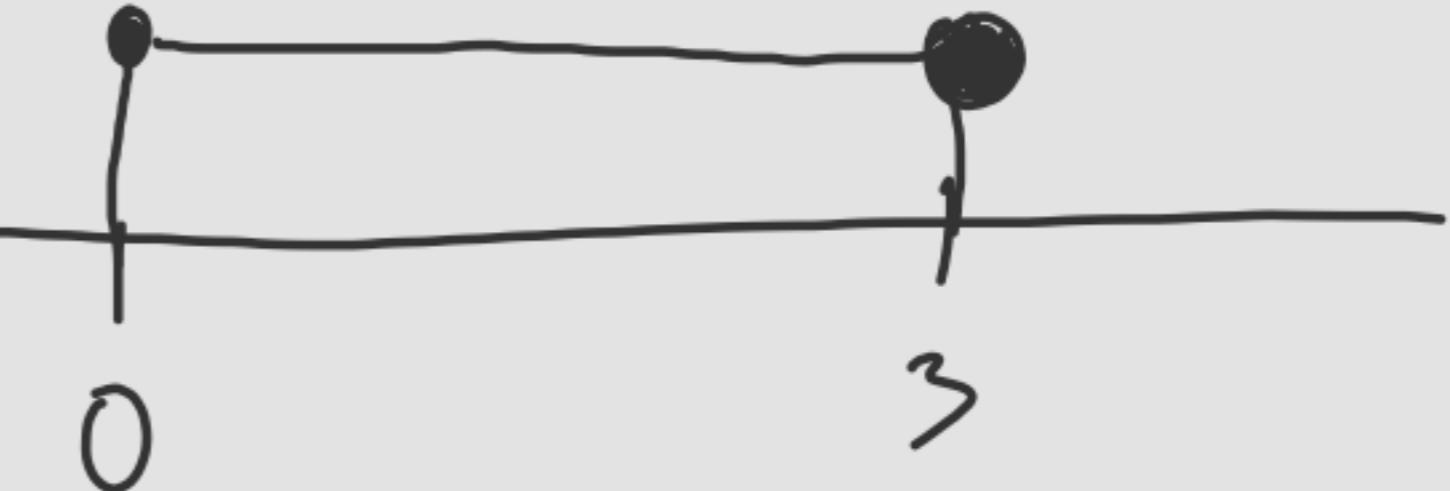
excluding 0 and 3



$(-1, 3)$

Closed interval

$[0, 3]$ → all the no t/w
0 to 3 including
0 and 3



Semi-open or semi-closed interval

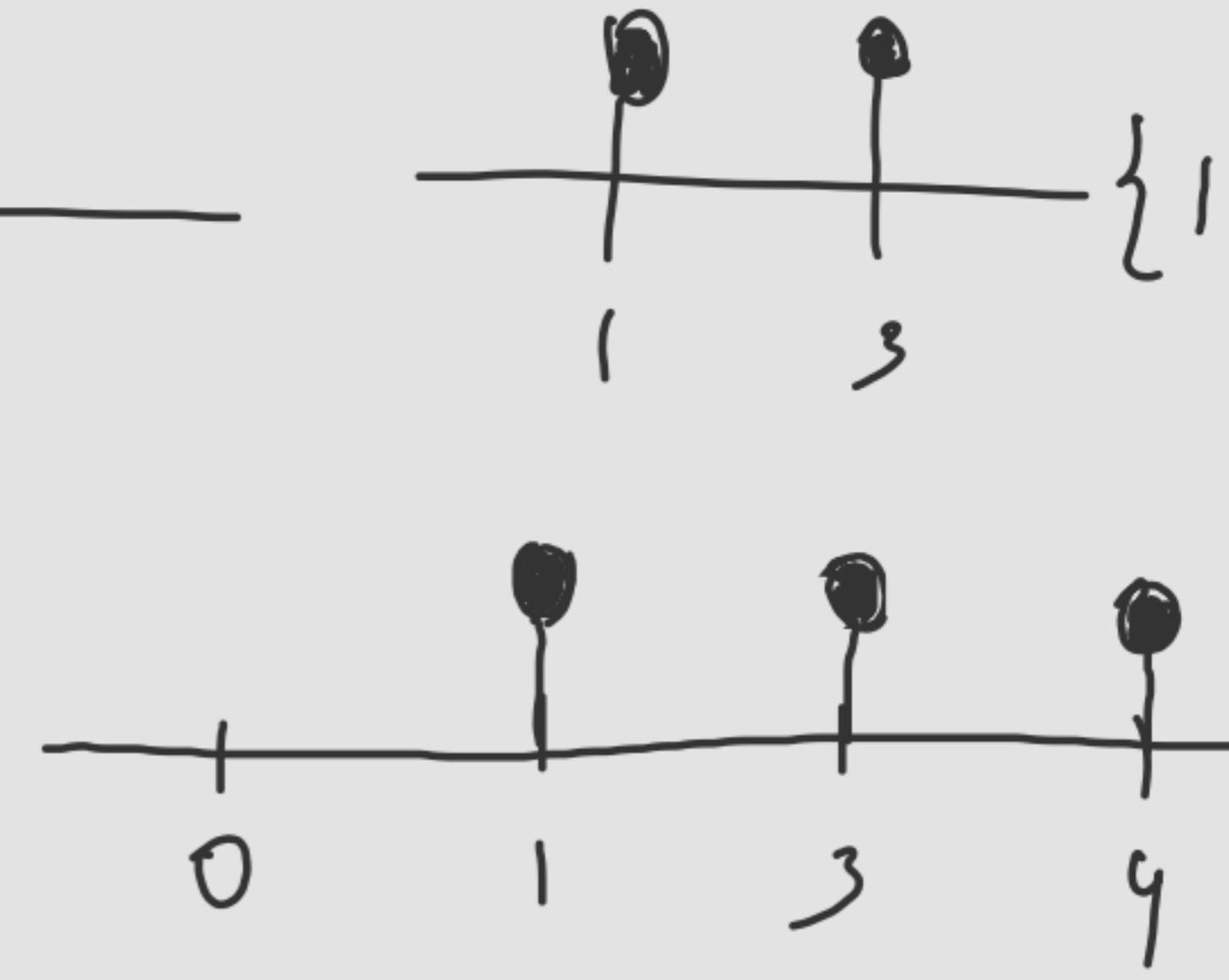
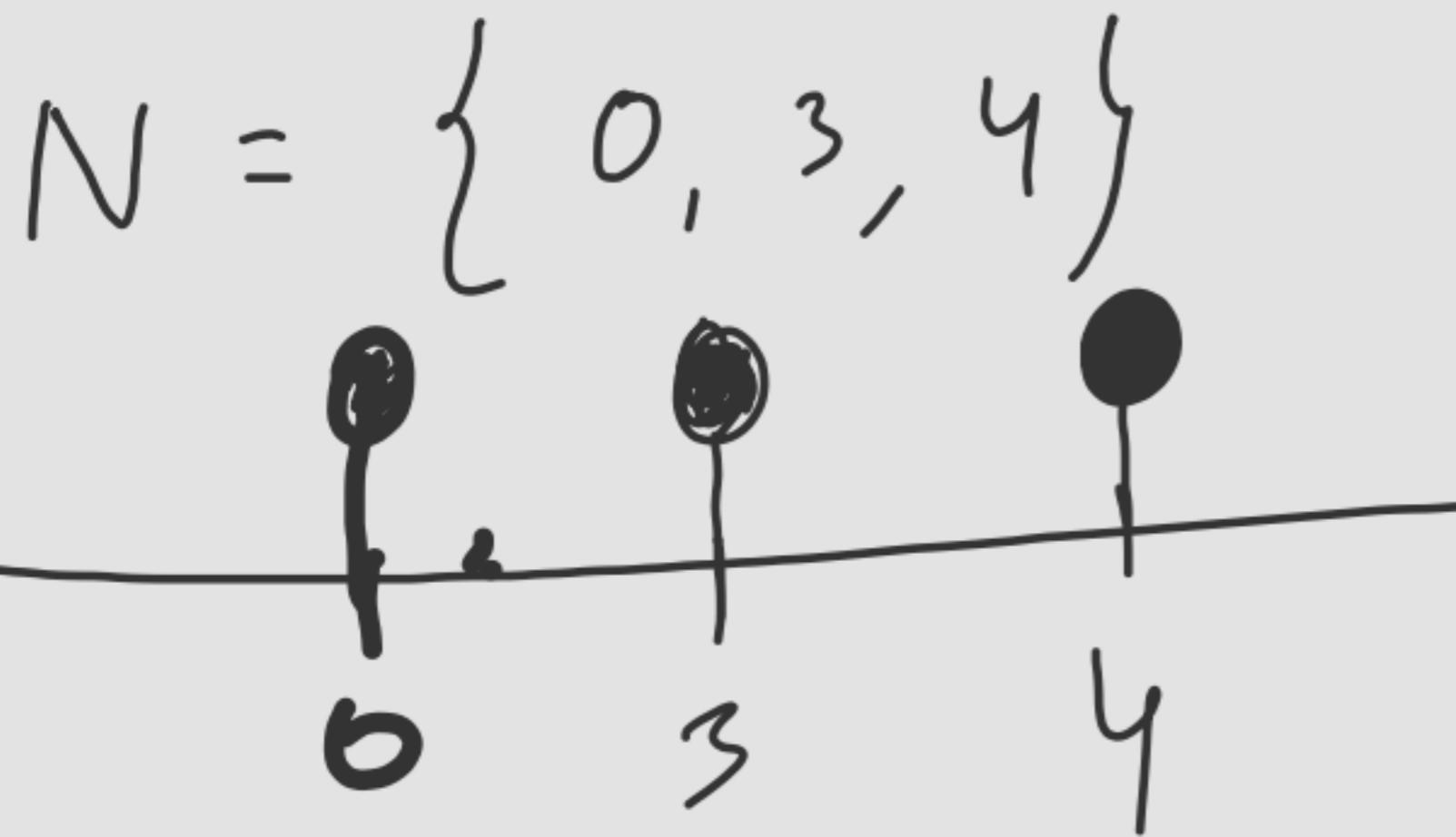


$$[0, 3) \stackrel{?}{=} [0, 3[$$



$$[-1, 3]$$

$$]0, 3[\equiv (0, 3)$$



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

$$2 < 5$$

$$\sqrt{5} > 2$$

$$\underline{x^2 + 1} > \underline{x^2}$$

$$x^2 - 4 < x^2$$

A hand-drawn diagram showing two complex numbers, $2+3i$ and $3+3i$, enclosed in an oval. Both numbers are crossed out with a large X.

$\geq \leq \geq \leq$

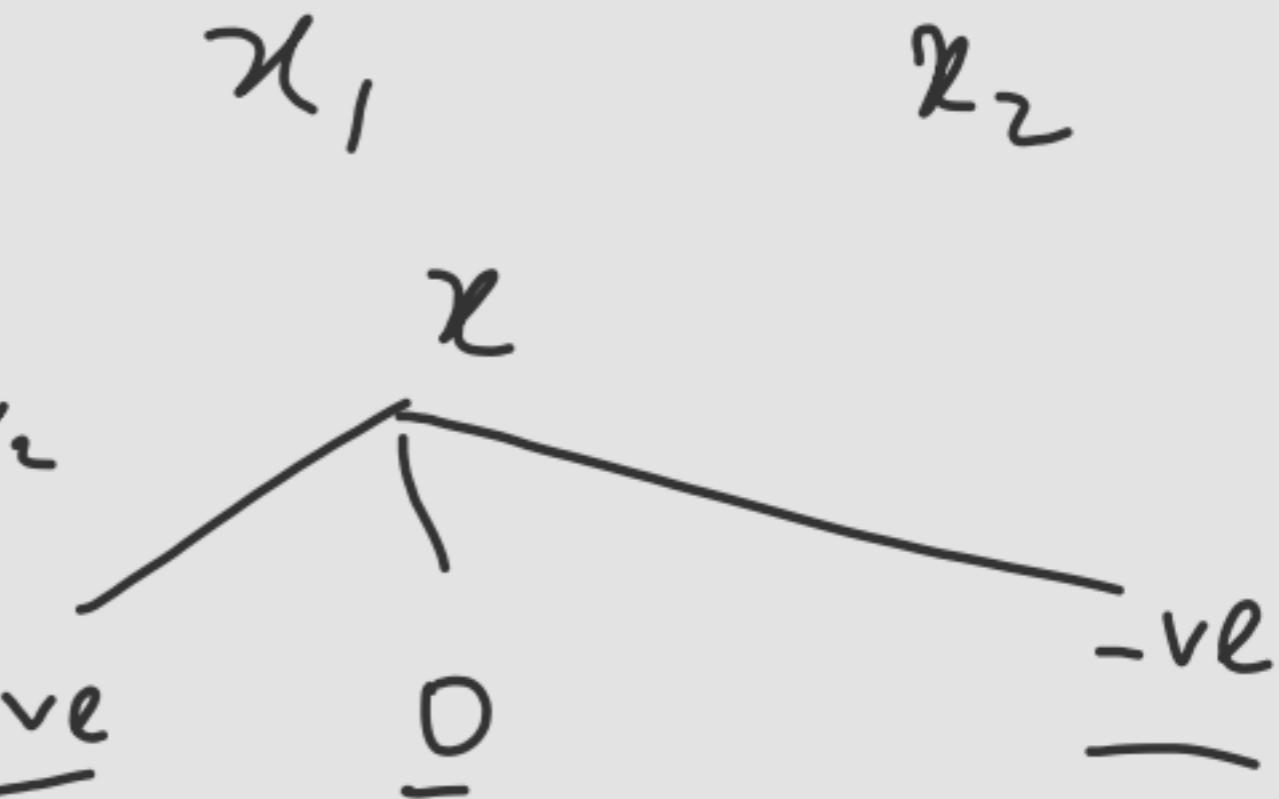
All the real have a very beautiful property that it can comp

law of trichotomy

$x_1 > x_2 \rightarrow x_1$ is greater than x_2

$x_1 < x_2 \rightarrow x_1$ is less than x_2

$x_1 = x_2 \rightarrow x_1$ is equal to x_2



$$\begin{array}{l} -2 > -5 \\ 5 > 3 \end{array} \left. \begin{array}{l} \text{numerical} \\ \text{inequality} \end{array} \right\}$$

s.t. $\left\{ \begin{array}{l} x^2 + 1 > x^L \\ x^2 + y^2 + 1 > 0 \end{array} \right.$ / $\left. \begin{array}{l} x^2 + y^2 \geq 2xy \\ x^2 \geq 0 \end{array} \right\}$ in

Properties of Inequalities

$$\left\{ \begin{array}{l} x > 0 \text{ or } y < 0 \\ \text{or} \\ x < 0 \text{ or } y > 0 \end{array} \right.$$

$$\underline{xy > 0}$$

Both are +ve

Both are -ve

$$\left\{ \begin{array}{l} x > 0 \text{ and } y < 0 \\ \text{or} \\ x < 0 \text{ and } y > 0 \end{array} \right.$$

Combining

$$xy < 0$$

$$\boxed{\begin{array}{l} + \times - = - \\ - \times + = - \end{array}}$$

$$\begin{aligned} a &> b \\ c &> d \end{aligned}$$

$$\begin{array}{c} 47^2 \\ 371 \\ \hline 773 \end{array}$$

$$\begin{aligned} a &= b \\ c &= d \end{aligned}$$

$$a+c = b+d$$

$$a+c > b+d \text{ (True)}$$

$$a-c = b-d$$

$$a-c > b-d \text{ (False)}$$

$$ac = bd$$

$$ac > bd \text{ (False)}$$

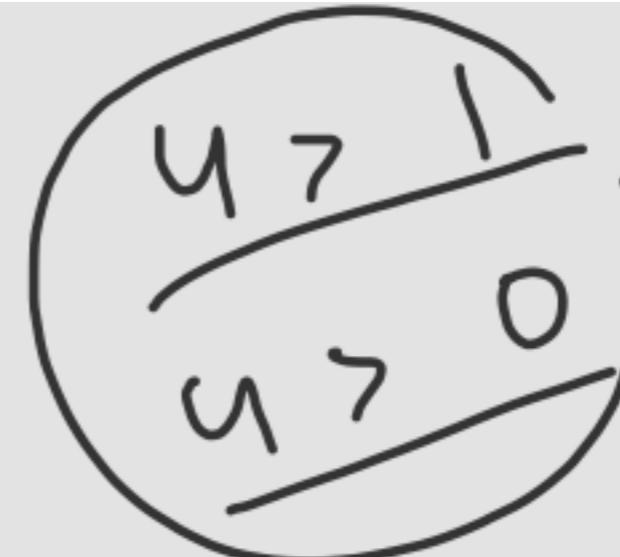
$$\frac{a}{c} = \frac{b}{d} \quad \{ c \neq d \}$$

$$\frac{a}{c} > \frac{b}{d} \text{ (False)}$$

$$a > b$$
$$c > d$$

$$\underline{a - c > b - d}$$

$$ac > bd$$



$$0 > 1$$

$$\begin{matrix} u > 2 \\ -u > -6 \end{matrix}$$

$$\begin{matrix} -16 < -12 \end{matrix}$$

$$a > b > 0$$

$$c > d > 0$$

a) $a+c > b+d$ (True)

b) $a-c > b-d$ (False)

c) $ac > bd$ (True)

d) $\frac{a}{c} > \frac{b}{d}$ (False)

$$2 > 1 > 0$$

$$u^2, v^2,$$



z
z

