Inequalities

$x^2+1 = x$ → equation

$x^2+1 \geq x$

$x^2-x+1 \geq 0$

$x > 4$

α β

0 1 2 3 4 4+1 5

$< \quad > \quad \leq \quad \geq$

$\cdot 1 > 4$

$5 > 4$

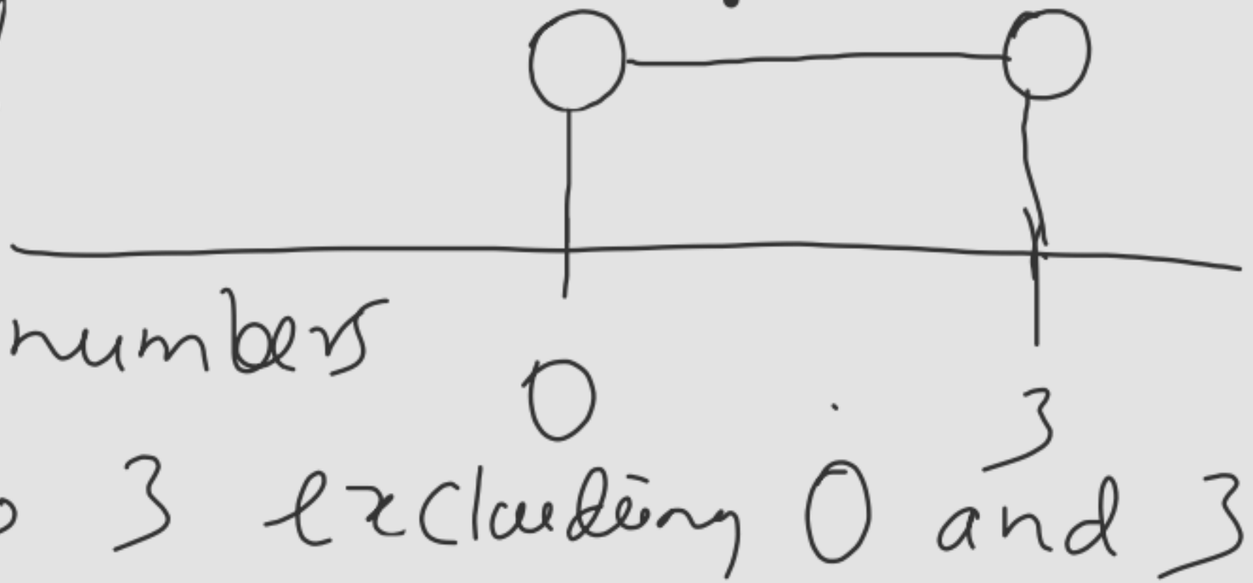
$3 \not> 4$

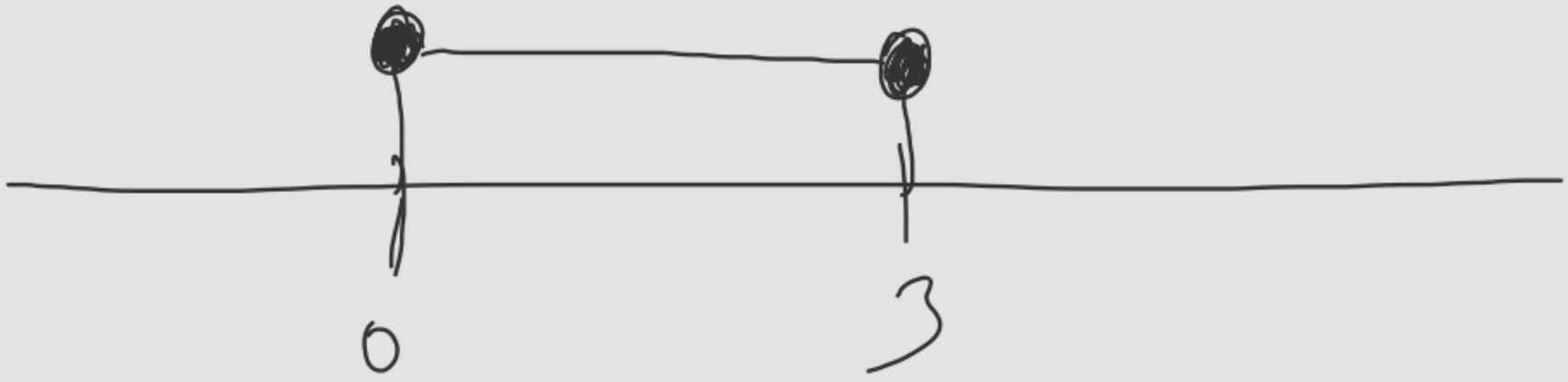
Inequality

$x > 4$

① Open interval

$(0, 3)$ → all the numbers b/w 0 to 3 excluding 0 and 3



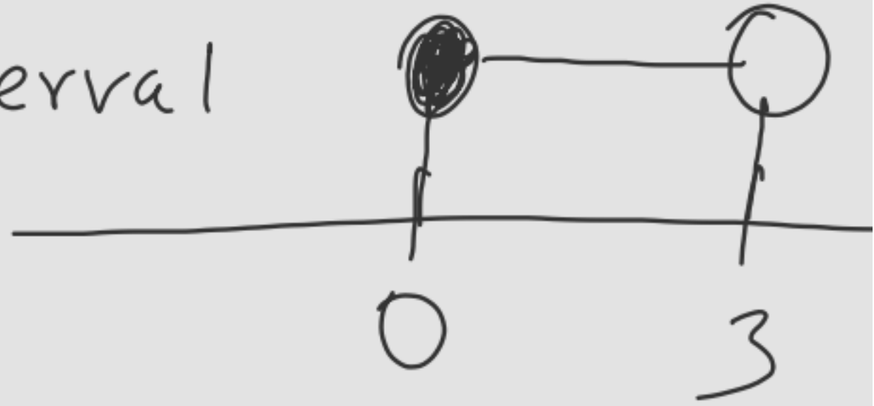


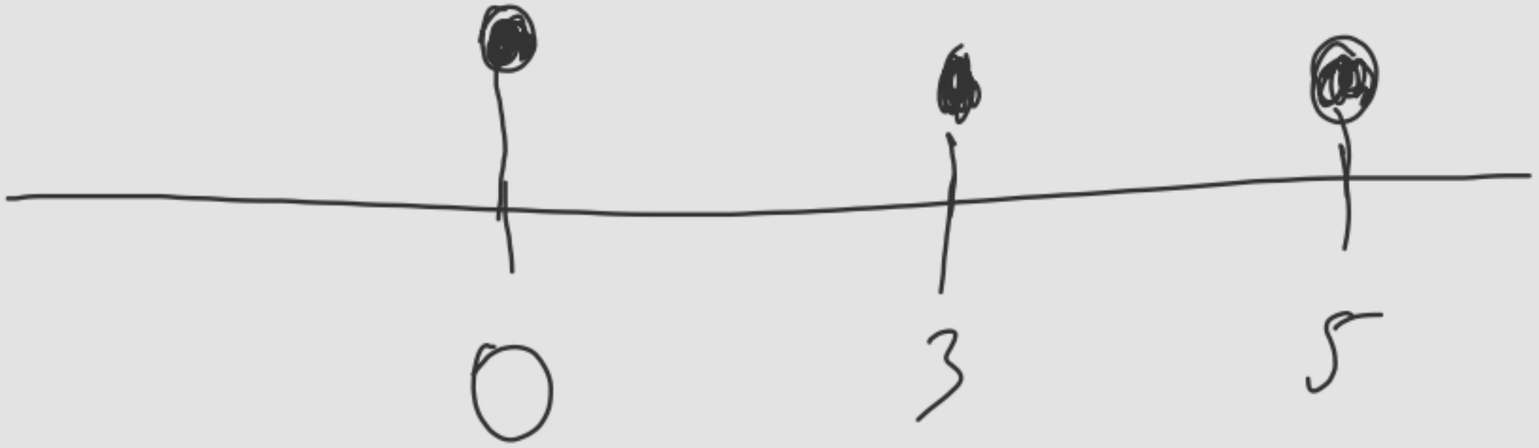
(I) Closed interval

- $[0, 3]$ → all the numbers b/w 0 to 3 including 0 and 3.

(II) Semi-closed or Semi open interval

$[0, 3)$





$\{0, 3, 5\}$ → discrete values which is 0, 3, 5

Set −!

Basic of inequality

Linear factor

or

Quadratic factor

or

polynomial factor

Logarithmic inequalit

$\log_x 2 > 0$

Trigonometric inequalit

$\sin x - \frac{1}{2} \geq 0$

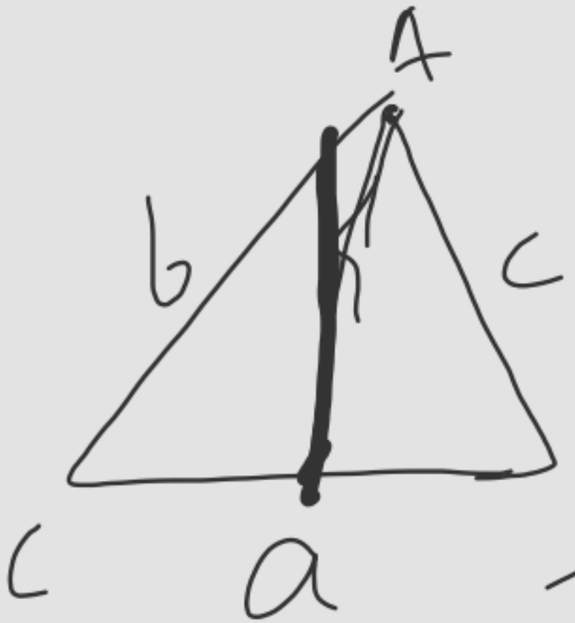
Inverse trigonometric inq

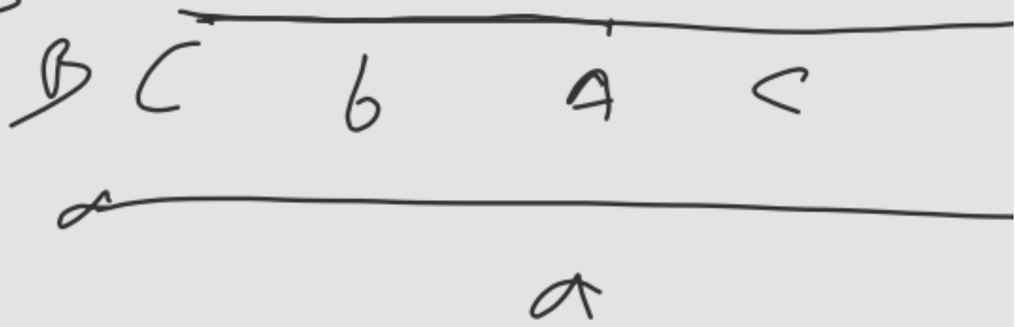
$\sin^{-1} x > \frac{\pi}{4}$

Triangular inequality

$$b + c \geq a$$

$$a + c \geq b$$





$$b + c = a$$

All real numbers have a beautiful property that they

Can be compared

$2 < 5$

$-3 < -2$

$3 = 3$

$\sqrt{5} > 2$

$x^2 + 1 > x^2$

$2 + 3i \not> 3 + 3$

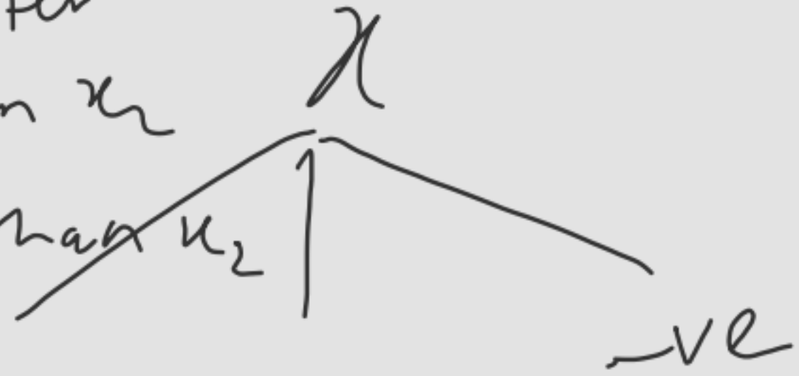
Law of trichotomy

x_1 x_2

$x_1 > x_2$ ✓ → x_1 is greater than x_2

$x_1 < x_2$ ✓ → x_1 is less than x_2

$x_1 = x_2$ ✓ x_1 is equal to x_2



$3 > -5$ } numerical inequality

$-3 > -5$ }

$2 > 1 > -3$

$-3 < 5 < 7$ } double inequality

$x^2 + 1 > x^2$

$x^2 - 4 < x^2$ } strict inequality

$x^2 + y^2 \geq 2xy$ } greater than or equal to

$x^2 + y^2 \leq 2$ } sl

Properties of Inequality

$x > 0$ and $y > 0$

or

$x < 0$ and $y < 0$

$$xy > 0$$

$2 \times 3 = > 0$

$-2 \times -3 > 0$

$x > 0$ and $y < 0$

or

$x < 0$ and $y > 0$

$\Rightarrow xy < 0$

+ve x −ve = −ve

−ve x +ve = −ve

$$\begin{cases} a > b \\ c > d \end{cases}$$

$$5 > 3$$
$$-3 > -5$$
$$2 > -2$$

$$a = b$$
$$c = d$$

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

$$a + c = b + d$$

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

$$a - c = b - d$$

$$ac > bd \quad (\text{false})$$

$$ac = bd$$

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

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

$a > b$ $\quad 3 > -2$

$c > d$ $\quad -3 > -4$

$-9 > 8$.

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

$4 > 2$

$4 > 1$

$0 > 1$

$7 > 5$

$8 > 5$

$-1 > 0$

$a > b > 0$

$c > d > 0$

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

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

$ac > bd$ (True)

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

$4 > 2$

$4 > 1$

$0 > 1$ ✗

$16 > 1$

$\frac{4}{4} > \frac{2}{1}$

$1 > 2$

$a > b$

$a + k > b + k$ (True)

$a - k > b - k$ (True)

$ak > bk$ (false)

$\frac{a}{k} > \frac{b}{k}$ (false)

$x_1 \quad x_2$

$2 \overset{?}{>} 1$

$4 > 2$

$-4 \not> 2$

K=

K=

$a > b$

$k > 0$

$ak > bk$

of an inequation is multiplied with the values then inequality remain same

$k < 0$

$ak < bk$

of an inequation is multiplied with -ve value the inequality will Change.

$3 > 2$

$x = 2$

$6 > 4$

$x = -2$

$-6 < -4$

$|x| = x$

$x = \pm 2$

$|x| = 2$

-2

2

$|-2| = 2$

$|2| = 2$

$$|x| = \begin{cases} x & \text{when } x \geq 0 \\ -x & \text{when } x < 0 \end{cases}$$

$$|2| = x = 2$$

$$|-2| = -(-2) = +2$$