Calculus 1

$$\sqrt{4} = 2$$

Real Numbers

$N = \{ 1, 2, 3, 4, \ldots \}$ Natural

$$\sqrt{3} = 1.732 \cdots -$$

$$\sqrt{2} \quad \text{irrational}$$

$W = \{ 0, 1, 2, 3, 4, \ldots \}$ Whole Number

$\sqrt{5}$

$Z = \{ \ldots, -3, -2, -1, 0, 1, 2, 3, \ldots \}$ integer

(R)

real numbers

$Q = \left\{ \dfrac{a}{b}, \ a \in Z, \ b \in Z, \ Z \neq 0 \right\}$

Rational   irrational

Rational number

$\dfrac{3}{0}$ $\dfrac{2}{1}$ undefined

$\text{(R)} = (-\infty, \infty)$

interval القترات

1 closed interval

$$X = [3, 7]$$

$3 \in X$
$7 \in X$

2 opened interval

$$X = (3, 7)$$

$3 \notin X$ $3.000001 \in X$
$7 \notin X$

3 Sim -open

$$[3, 7)$$ $$(3, 7]$$

$$(-\infty, \infty) = R$$

Properties of Real number

1. $X + y = y + X$

2. $X + 0 = X$

3. $(X + y) + Z = X + (y + Z)$

4. $X - y \neq y - X$

5. $XY = yX$ $\dfrac{X}{y} \neq \dfrac{y}{X}$

6. $X \cdot 1 = X$

7. $X \cdot (y \cdot Z) = (X \cdot y) \cdot Z$
   $X(Y + Z) = Xy + XZ$

Set Notation

1 intersection التقاطع

$$\{1,2,3\} \cap \{2,4,5\} = \{2\}$$

$A \cap B = B \cap A$

2 Union الإتحاد

$$\{1,2,3\} \cup \{2,4,5\} = \{1,2,3,4,5\}$$

$A \cup B = B \cup A$

3 difference الفرق

$$\underset{A}{\{1,2,3\}} - \underset{B}{\{2,4,5\}} = \{1,3\}$$

$$A - B \neq B - A$$

$$A - B = \{1,3\} \qquad B - A = \{4,5\}$$

4 supset

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

$\{1\} \subseteq A \qquad \{2,3\} \subseteq A$

$\Phi = \{\ \}$ empty set

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

$$2^n = 2^3 = 8$$

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

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

Equation اطردلت

$X + 3 = 4$

$\boxed{X = 1}$

$2X + 4 = 7$

$2X = 7 - 4$

$2X = 3$

$\boxed{X = \dfrac{3}{2}}$

$4 \leq X + 3 \leq 7$

$4 - 3 \leq X + 3 - 3 \leq 7 - 3$

$1 \leq X \leq 4$
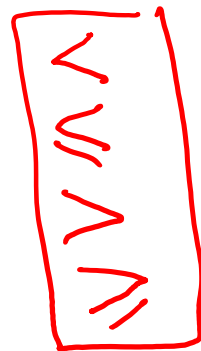
$[1 , 4]$ #

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inequality المتباينة

$X + 3 < 4$

$X < 4 - 3$

$\boxed{X < 1}$

$(-\infty , 1)$
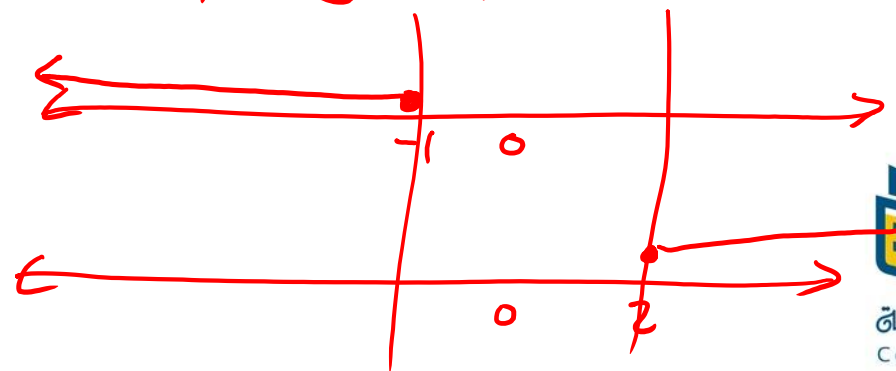
$X \leq 1$

$(-\infty , 1]$

$\boxed{< \leq > \geq}$
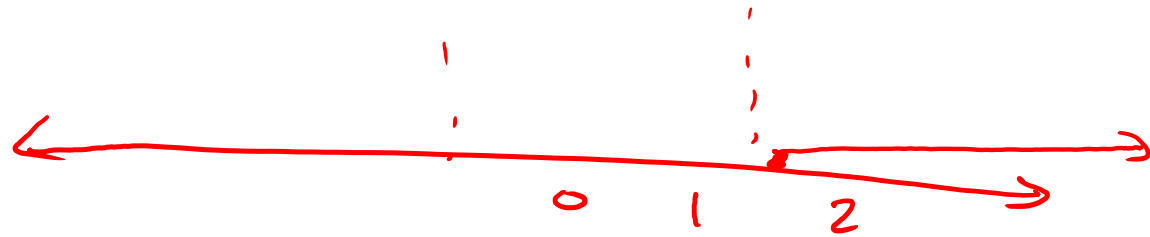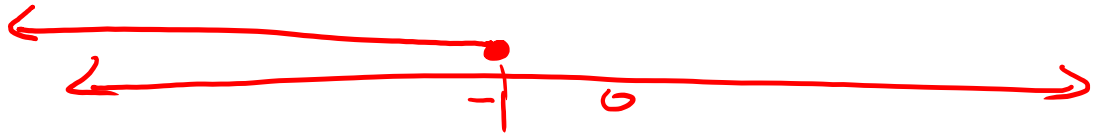
$X \leq -1$ and $X \geq 2$

$(-\infty , -1] \cap [2 , \infty) = \phi$

$$x \leq -1 \quad \text{or} \quad x \geq \tfrac{3}{2}$$

$$(-\infty, -1] \quad U \quad \left[\tfrac{3}{2}, \infty\right) = (-\infty, \infty) - \left(-1, \tfrac{3}{2}\right)$$

$$(-\infty, 3] \quad U \quad [2, \infty) = (-\infty, \infty)$$