③ $d(x,y) = |x-y| = |y-x| = d(y,x)$

④ let $x,y,z \in R$

$$d(x,y) = |x-y| = |x-z+z-y| \leq |x-z|+|z-y|$$
$$\leq d(x,z) + d(z,y)$$

∴ $d$ is ametric

$(R,d)$ is ausual metric space.

**Examples:-** let $X$ be any set

$d: X \times X \longrightarrow R$ defined by $d(x,y) = \begin{cases} 1 & \text{if } x \neq y \\ 0 & \text{if } x = y \end{cases}$

Then $d$ is ametric (is called trivial metric) and $(X,d)$ is called metric space.

Solution:- ① suppose $d(x,y) > 0$

$\Rightarrow d(x,y) = 1 \Rightarrow x \neq y$

$\Leftarrow$ Conversely suppose $x \neq y$

∴ $d(x,y) = 1 \Rightarrow d(x,y) > 0$

② suppose $d(x,y) = 0$

$\Rightarrow x = y$

$\Leftarrow$ conversely suppose $x = y$

$\Rightarrow d(x,y) = 0$

③ if $x \neq y \Rightarrow d(x,y) = 1$, $d(y,x) = 1$

∴ $d(x,y) = d(y,x)$

if $x = y$

$\Rightarrow d(x,y) = 0$, $d(y,x) = 0$

∴ $d(x,y) = d(y,x)$

④ Let $x,y,z \in X$ T.p $d(x,y) \leq d(x,z) + d(z,y)$

① if $x = y = z$

$d(x,y) = 0$ , $d(x,z) = 0$, $d(z,y) = 0$

$d(x,y) \le d(x,z) + d(z,y)$

$0 = 0 + 0 = 0$

② if $x \ne y \ne z$

$d(x,y) = 1$ , $d(x,z) = 1$ , $d(z,y) = 1$

$d(x,y) \le d(x,z) + d(z,y)$

$1 \le 1 + 1 = 2$

③ if $x = y \ne z$

$d(x,y) = 0$ , $d(x,z) = 1$ , $d(z,y) = 1$

$d(x,y) \le d(x,z) + d(z,y)$

$0 \le 1 + 1 = 2$

$\therefore$ d is ametric , $(x, d)$ is ametric space.

**Examplex :-** let $X = R^2$ , $d : R^2 \times R^2 \to R$ defined by

$$d(x_1, x_2)(y_1, y_2) = \sqrt{(y_2 - x_2)^2 + (y_1 - x_1)^2}$$

The d is ametric o $R^2$ ( is called the usual metric on $R^2$) and $(R^2, d)$ is ametric space.