Lecture 01 : BASICS OF FUNCTIONS AND LIMITS

Eplicit Function :

$$y = f(x)$$

Both the variables x & y are separable.

Implicit Function :

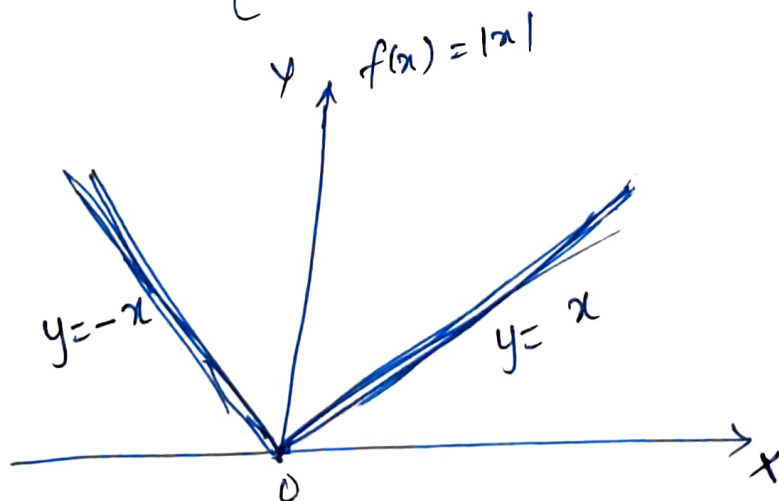$$f(x,y) = 0$$

Both the variables x & y cannot be separated.

Composite function :

$$x = \psi(t) \qquad \& \qquad y = \phi(t).$$

$f(x,y)$ = composite functn.

Modulus Function :

$$f(x) = |x| = \begin{cases} -x & ; \quad x < 0 \\ x & ; \quad x > 0 \end{cases}$$

Limit :

Limit of a function $f(x)$ at $x = a$ exists if and only if

$$\left[\begin{array}{c} \text{Left hand limit} \\ (LHL) \\ \text{at} \quad x = a \end{array}\right] = \left[\begin{array}{c} \text{Right hand limit} \\ (RHL) \\ \text{at} \quad x = a \end{array}\right]$$

i.e,

$$LHL = \lim_{x \to a^-} f(x) = \lim_{h \to 0} f(a-h)$$

$$RHL = \lim_{x \to a^+} f(x) = \lim_{h \to 0} f(a+h)$$

Limit exists for $f(x)$ at $x = a$ iff

$$\lim_{x \to a^-} f(x) = \lim_{x \to a^+} f(x)$$