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#Limit-----

Let  $y = f(x)$  be a function of  $x$ . If at  $x = a$ ,  $f(x)$  takes indeterminate form, then we consider the values of the function which is very near to  $a$ . If these value tend to a definite unique number as  $x$  tends to  $a$ , then the unique number so obtained is called the limit of  $f(x)$  at  $x = a$ .

### Left Hand and Right-Hand Limits

If values of the function at the point which are very near to  $a$  on the left tends to a definite unique number as  $x$  tends to  $a$ , then the unique number so obtained is called the left-hand limit of  $f(x)$  at  $x = a$ , we write it as

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

Similarly, right hand limit is

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

$\lim_{x \rightarrow a} f(x)$  exists, if

(i)  $\lim_{x \rightarrow a^-} f(x)$  and  $\lim_{x \rightarrow a^+} f(x)$  both exists

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