TYPES OF DISCONTINUITIES

Removable type of discontinuities

In case $\lim\limits_{x\to a} f(x)$ exists but is not equal to f(a) then the function is said to have a removable discontinuity or discontinuity of the first kind. In this case we can redefine the function such that $\lim\limits_{x\to a} f(x) = f(a)$ & make it continuous at $x = a$. Removable type of discontinuity can be further classified as:

Missing point discontinuity

Where $\lim\limits_{x\to a} f(x)$ exists but f(a) is not defined.

Isolated point discontinuity

Where $\lim\limits_{x\to a} f(x)$ exists & f(a) also exists but; $\lim\limits_{x\to a} f(x) \neq f(a)$.

Non-Removable type of discontinuities

In case $\lim\limits_{x\to a} f(x)$ does not exist then it is not possible to make the function continuous by redefining it. Such a discontinuity is known as non-removable discontinuity or discontinuity of the 2nd kind. Non-removable type of discontinuity can be further classified as:

Finite type discontinuity

In such type of discontinuity left hand limit and right hand limit at a point exists but are not equal.

Infinite type discontinuity

In such type of discontinuity atleast one of the limit viz. LHL and RHL is tending to infinity.

Oscillatory type discontinuity

e.g. $f(x) = \sin\frac{\pi}{x}$ at $x = 0$

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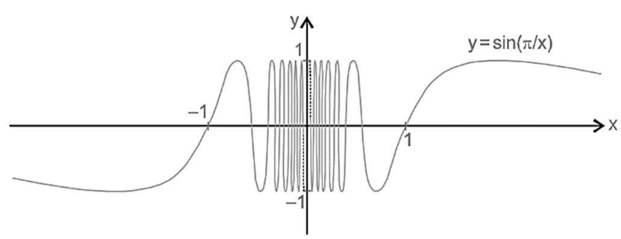

f(x) has non removable oscillatory type discontinuity at $x = 0$

Example From the adjacent graph note that

i. f is continuous at $x = -1$
ii. f has isolated discontinuity at $x = 1$
iii. f has missing point discontinuity at $x = 2$
iv. f has non removable (finite type) discontinuity at the origin.