$$f(x) = \begin{cases} -1, & \frac{1}{2} \le x < 1 \\ 1, & \frac{1}{3} \le x < \frac{1}{2} \\ -1, & \frac{1}{4} \le x < \frac{1}{3} \\ 1, & \frac{1}{5} \le x < \frac{1}{4} \\ -1, & \frac{1}{6} \le x < \frac{1}{5} \\ \vdots & \end{cases} \quad \Bigg| \quad \begin{array}{ll} 0, & x = 0 \\ 1, & x = 1 \end{array}$$

at $x = 1$ $\quad f(1) = 1, \quad$ L.H.L. $= \lim_{1^-} f(x) = -1$

L.H.L. $\neq f(1)$ $\quad f$ is discontinuous at $x = 1$.

at $x = \frac{1}{2}$, $\quad f(\frac{1}{2}) = -1$

L.H.L. $\quad \lim_{x \to \frac{1}{2}^-} f(x) = 1$

R.H.L. $\quad \lim_{x \to \frac{1}{2}^+} f(x) = -1$

L.H.L. $\neq$ R.H.L. $\quad f$ is discts. at $x = \frac{1}{2}$

Similarly doing this f is discontinuous at each $x = \frac{1}{n}$, $n \in N$.

f is discontinuous at $x = 1, \frac{1}{2}, \frac{1}{3}, \cdots$