

Note: In questions of finding limit involving greatest integer function [ ], fractional part function { }, least integer function ( ), modulus function | | etc., it is advisable to find LHL and RHL both.

$$\begin{aligned} \text{LHL} &= \lim_{h \rightarrow 0} \left[ \frac{\text{Sin}[-h-3]}{[-h-3]} \right] \\ &= \lim_{h \rightarrow 0} \left[ \frac{\text{Sin}(-4)}{-4} \right] \\ &= \lim_{h \rightarrow 0} \left[ \frac{\text{Sin}4}{4} \right] \\ &= \lim_{h \rightarrow 0} \left[ \frac{\text{-ve fraction}}{4} \right] \quad \left( \text{as } \pi < 4 < \frac{3}{2}\pi, \text{ which means that } 4 \text{ lies in third quadrant.} \right. \\ &\quad \left. \text{Sin is -ve in third quadrant.} \right) \\ &= -1 \end{aligned}$$

$$\begin{aligned} \text{RHL} &= \lim_{h \rightarrow 0} \left[ \frac{\text{Sin}[h-3]}{[h-3]} \right] \\ &= \lim_{h \rightarrow 0} \left[ \frac{\text{Sin}(-3)}{-3} \right] \\ &= \lim_{h \rightarrow 0} \left[ \frac{\text{Sin}3}{3} \right] \\ &= \lim_{h \rightarrow 0} \left[ \frac{\text{+ve fraction}}{3} \right] \quad \left( \text{as } \frac{\pi}{2} < 3 < \pi, \text{ which means that } 3 \text{ lies in second quadrant.} \right. \\ &\quad \left. \text{Sin is +ve in second quadrant.} \right) \\ &= 0 \end{aligned}$$

Since, LHL  $\neq$  RHL, the limit does not exist.