

Illustration 38 Evaluate $\lim_{x \rightarrow \infty} 2^{-x} \sin(2^x)$.

Solution. $2^{-x} = \frac{1}{2^x}$

We know, as $x \rightarrow \infty$, $2^x \rightarrow \infty$

\therefore The given limit = $0 \times [\text{A finite number between } -1 \text{ and } +1] = 0$

Hence,
$$\lim_{x \rightarrow \infty} \frac{\sin(2^x)}{(2^x)} = 0$$