Exercise 36

Use continuity to evaluate the limit.

$$\lim_{x \to \pi} \sin(x + \sin x)$$

Solution

Apply Theorem 8 to bring the limit inside the sine function. This theorem applies because the sine function is continuous at π, the limit of the inner function as $x \to \pi$.

$$
\begin{aligned}
\lim_{x \to \pi} \sin(x + \sin x) &= \sin\left[\lim_{x \to \pi}(x + \sin x)\right] \\
&= \sin(\pi + \sin \pi) \\
&= \sin(\pi) \\
&= 0
\end{aligned}
$$