

Exercise 150

For the following exercises, verify that each equation is an identity.

$$\frac{\sin x}{\cos x + 1} + \frac{\cos x - 1}{\sin x} = 0$$

Solution

$$\begin{aligned}\frac{\sin x}{\cos x + 1} + \frac{\cos x - 1}{\sin x} &\stackrel{?}{=} 0 \\ \frac{\sin x(\sin x) + (\cos x - 1)(\cos x + 1)}{(\cos x + 1)\sin x} &\stackrel{?}{=} 0 \\ \frac{\sin^2 x + (\cos^2 x + \cos x - \cos x - 1)}{(\cos x + 1)\sin x} &\stackrel{?}{=} 0 \\ \frac{(\sin^2 x + \cos^2 x) - 1}{(\cos x + 1)\sin x} &\stackrel{?}{=} 0 \\ \frac{(1) - 1}{(\cos x + 1)\sin x} &\stackrel{?}{=} 0 \\ 0 &= 0\end{aligned}$$

This is a true statement, so the identity is verified.