Exercise 24

Find an equation of the tangent line to the curve at the given point.

$$y = x + \tan x, \quad (\pi, \pi)$$

Solution

With one point known on the line, all that we need to know is its slope. This is found by calculating the derivative of the given curve

$$\begin{aligned} y' &= \frac{d}{dx}(x + \tan x) \\ &= \frac{d}{dx}(x) + \frac{d}{dx}(\tan x) \\ &= (1) + (\sec^2 x) \end{aligned}$$

and evaluating it at $x = \pi$.

$$y'(\pi) = 1 + 1 = 2$$

Therefore, the equation of the tangent line at (π, π) is

$$y - \pi = 2(x - \pi).$$

The tangent line and the given curve are shown below.