

Exercise 23

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

$$y = \cos x - \sin x, \quad (\pi, -1)$$

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

$$\begin{aligned} y' &= \frac{d}{dx}(\cos x - \sin x) \\ &= \frac{d}{dx}(\cos x) - \frac{d}{dx}(\sin x) \\ &= (-\sin x) - (\cos x) \end{aligned}$$

and evaluating it at $x = \pi$.

$$y'(\pi) = -\sin \pi - \cos \pi = 1$$

Therefore, the equation of the tangent line at $(\pi, -1)$ is

$$y + 1 = 1(x - \pi).$$

The tangent line and the given curve are shown below.

