

Exercise 26

- (a) Find an equation of the tangent line to the curve $y = 3x + 6 \cos x$ at the point $(\pi/3, \pi + 3)$.
- (b) Illustrate part (a) by graphing the curve and the tangent line on the same screen.

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

$$\begin{aligned}y' &= \frac{d}{dx}(3x + 6 \cos x) \\&= \frac{d}{dx}(3x) + \frac{d}{dx}(6 \cos x) \\&= (3) + (-6 \sin x)\end{aligned}$$

and evaluating it at $x = \pi/3$.

$$y'(\pi) = (3) + (-3\sqrt{3}) = 3(1 - \sqrt{3})$$

Therefore, the equation of the tangent line at $(\pi/3, \pi + 3)$ is

$$y - \pi - 3 = 3(1 - \sqrt{3}) \left(x - \frac{\pi}{3}\right).$$

The tangent line and the given curve are shown below.

