

## Exercise 25

- (a) Find an equation of the tangent line to the curve  $y = 2x \sin x$  at the point  $(\pi/2, \pi)$ .
- (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

$$\begin{aligned}y' &= \frac{d}{dx}(2x \sin x) \\&= \left[ \frac{d}{dx}(2x) \right] \sin x + 2x \left[ \frac{d}{dx}(\sin x) \right] \\&= (2) \sin x + 2x(\cos x)\end{aligned}$$

and evaluating it at  $x = \pi/2$ .

$$y'(\pi) = (2)1 + \pi(0) = 2$$

Therefore, the equation of the tangent line at  $(\pi/2, \pi)$  is

$$y - \pi = 2 \left( x - \frac{\pi}{2} \right).$$

The tangent line and the given curve are shown below.

