

Exercise 40

Find an equation of the tangent line to the curve at the given point. Illustrate by graphing the curve and the tangent line on the same screen.

$$y = x - \sqrt{x}, \quad (1, 0)$$

Solution

Since we have a point on the line, we just need to find the line's slope. The aim, then, is to take the derivative of the given function and evaluate it at the given x -coordinate.

$$\begin{aligned} y' &= \frac{d}{dx}(x - x^{1/2}) \\ &= \frac{d}{dx}(x) - \frac{d}{dx}(x^{1/2}) \\ &= (1) - \left(\frac{1}{2}x^{-1/2}\right) \\ &= 1 - \frac{1}{2}x^{-1/2} \end{aligned}$$

Evaluate it at $x = 1$.

$$y'(1) = \frac{1}{2}$$

Therefore, the equation of the tangent line to $y = x - \sqrt{x}$ at $(1, 0)$ is

$$y - 0 = \frac{1}{2}(x - 1).$$

