

Quiz I

Section 1.1 - 1.3

August 31, 2006

Problem 1. Find the point on the graph of $y = x^2$ where the tangent line is parallel to the line $x + 2y = 4$.

Solution. The first thing we need to do is to determine the slope of the line $x + 2y = 4$. To do this we want to get y alone on one side of the equation with no coefficients (numbers) in front of it.

$$\begin{aligned}x + 2y - x &= 4 - x \\ \frac{2y}{2} &= \frac{4}{2} + \frac{-1}{2}x\end{aligned}$$

So the line has slope $m_{tan} = \frac{-1}{2}$, we want to find the point on the curve where $y'(x) = m_{tan}$. Using the power rule, we have that $y'(x) = 2x$, so we want to find the value of x with

$$\begin{aligned}2x &= \frac{-1}{2} \\ x &= \frac{-1}{4}\end{aligned}$$

Now, we have the x -value, we will have the point (x, x^2) on the curve. So, our answer is

$$\left(\frac{-1}{4}, \left(\frac{-1}{4}\right)^2\right) = \left(\frac{-1}{4}, \frac{1}{16}\right)$$

□

Problem 2. Find the equation of the tangent line to the curve $y = \sqrt{x}$ at $x = 4$.

Solution. We have the point on the curve $(4, \sqrt{4}) = (4, 2)$, and we can find the slope of the tangent line via the derivative.

$$\begin{aligned}y'(x) &= \frac{1}{2\sqrt{x}} \\ m_{tan} = y'(x) &= \frac{1}{2\sqrt{4}} = \frac{1}{4}\end{aligned}$$

So, we can use the point-slope formula to get:

$$y - 2 = \frac{1}{4}(x - 4)$$

$$y = \frac{1}{4}x + 1$$

□