

Math 2215 - Calculus 1

Quiz #7 - 2017.09.13

Solutions

If $f(x) = \frac{1}{2x+1}$, compute $f'(x)$ by using the limit definition of the derivative:

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

First, note that $f(1) = 1$, so all we need now is $f'(1)$:

$$\begin{aligned} f'(1) &= \lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h} \\ &= \lim_{h \rightarrow 0} \frac{\frac{1}{2(1+h)-1} - 1}{h} \\ &= \lim_{h \rightarrow 0} \frac{1 - (2+2h-1)}{2+2h-1} \\ &= \lim_{h \rightarrow 0} \frac{-2h}{1+2h} \\ &= \lim_{h \rightarrow 0} \frac{-2h}{1+2h} \cdot \frac{1}{h} \\ &= \lim_{h \rightarrow 0} \frac{-2}{1+2h} \\ &= \frac{-2}{1} \\ &= -2 \end{aligned}$$

So the equation of the tangent line is given by $y - 1 = -2 \cdot (x - 1)$.