

MATH 1100-A 2008 Quiz 5
Sections 2.7, 2.8 and 3.1

1. Differentiate the function

$$y = \frac{3x^2 - 5x + 10}{\sqrt{x}}.$$

Solution: Since

$$\begin{aligned} y &= \frac{3x^2 - 5x + 10}{\sqrt{x}} \\ &= 3x^{\frac{3}{2}} - 5x^{\frac{1}{2}} + 10x^{-\frac{1}{2}} \\ y' &= 3 \left(\frac{3}{2} \right) x^{\frac{1}{2}} - 5 \left(\frac{1}{2} \right) x^{-\frac{1}{2}} + 10 \left(-\frac{1}{2} \right) x^{-\frac{3}{2}} \end{aligned}$$

□

2. Use the limit definition to find the slope of the tangent line to the curve

$$y = \frac{1}{x + 2}$$

at the point $(1, \frac{1}{3})$.

Solution: The slope of the tangent line is

$$\begin{aligned} f'(1) &= \lim_{h \rightarrow 0} \frac{f(1+h) - f(1)}{h} \\ &= \lim_{h \rightarrow 0} \frac{\frac{1}{1+h+2} - \frac{1}{3}}{h} \\ &= \lim_{h \rightarrow 0} \frac{\frac{1}{3+h} - \frac{1}{3}}{h} = \lim_{h \rightarrow 0} \frac{\frac{3-(3+h)}{(3+h)3}}{h} \\ &= \lim_{h \rightarrow 0} \frac{\frac{-h}{9+3h}}{h} = \lim_{h \rightarrow 0} \frac{-1}{9+3h} \\ &= -\frac{1}{9}. \end{aligned}$$

□