

MATH 1850 Sec 001
SINGLE VARIABLE CALCULUS I
QUIZ 3
February 7, 2013

Name (Last, First) Key

1. Find the limit

$$\begin{aligned} & \lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 2}}{3x + 1} \\ &= \lim_{x \rightarrow \infty} \frac{\sqrt{x^2}}{3x} \\ &= \lim_{x \rightarrow \infty} \frac{x}{3x} = \boxed{\frac{1}{3}} \end{aligned}$$

2. Using the definition of the derivative, find the slope of the tangent line to the curve

$f(x) = 1 - x^2$ at the point $(1, 0)$. (Remember $f'(x_0) = \lim_{h \rightarrow 0} \frac{f(x_0 + h) - f(x_0)}{h}$)

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