DO NOW: Find 3 things.
○ Round 2 Problem Set
○ Graded Problem Set
○ Notes from last class (2.6)
Exploring Slope of the Tangent Line

Find the slope of the tangent line to the graph of \( f(x) = 2x - 3 \) at \((2, 1)\).

Using the Slope of the Tangent Line

Find the slope of the graph of \( g(x) = x^2 \) at the point \((2, 4)\). Find the slope of the tangent line at this point:

\[
\lim_{{\Delta x \to 0}} \frac{g(x + \Delta x) - g(x)}{\Delta x} = \left( x + \Delta x \right)^2 - x^2 = x^2 + 2x\Delta x + \Delta x^2 - x^2 = \frac{\Delta x(2x + \Delta x)}{\Delta x} = 2x + \Delta x \]

At \( x = 2 \):

\[
\frac{1}{\Delta x} \left( x + \Delta x \right) \left( x + \Delta x \right) \rightarrow \text{slope} = 2(2) = 4
\]
\[
\lim_{x \to \infty} \frac{1}{x} = 0
\]

Let \( h(x) = \frac{1}{x} \)

a) Find the slope of the curve at any value of \( x \)

\[
\lim_{h \to 0} \frac{x}{h(x+h)} \cdot \frac{x}{x+h} = \lim_{h \to 0} \left( \frac{x}{x+h} \right) = -\frac{1}{x^2}
\]

b) Where does the slope of the curve equal \(-\frac{1}{4}\)?

\[
-\frac{1}{x^2} = -\frac{1}{4} \\
x^2 = 4 \\
x = \pm 2
\]

The function \( y = 2t^2 - 1 \) represents the position in feet of an object at time \( t \) seconds. Find the instantaneous rate of change (aka \textit{velocity}) at \( t = 2 \). Indicate units of measure.

\[
\lim_{\Delta t \to 0} \frac{[a(t+\Delta t)^2-1] - [2t^2-1]}{\Delta t}
\]

\[
\lim_{\Delta t \to 0} \frac{a t^2 + 4t \Delta t + 2 \Delta t^2 - 1 - 2t^2 + 1}{\Delta t}
\]

\[
\lim_{\Delta t \to 0} \frac{\Delta t (4t + 2 \Delta t)}{\Delta t} = 4t
\]

\( a + t = 2 \)

\( a = 8 \) ft/sec
Things you can do:
○ Round 2 Problem Set (due at end of class)
○ Graded Problem Set (due 10/3)
○ Test Review
○ 2.4/2.5 Notes Check & 2.6 Notes Check
○ Correct old notes checks

DO SOMETHING THAT IS CALCULUS.