2.1: The Tangent & Velocity Problems.

The tangent & secant lines graphically.

↳ MATHEMATICA.

Ave Roc → Inst. Roc.

Ex1: (EWA 2.1.003) (2, -1) lies on $y = \frac{1}{1-x}$.

(a) estimate the slope of the secant for

$x = 1.5, 1.9, 1.99, \ldots$

$2.5, 2.1, 2.01, \ldots$

(b) est. slope of the tangent.

(c) Find the eqt. of the tangent line.

Notice that if a car is driving along a curve, its head lights point along the tangent.

If the curve represents the position of a car (say mile marker on I-5 as a fct of time... find the Ave Roc & inst. Roc

ex 2: If a ball is dropped from a height of 20 ft, its ht in ft t seconds later is given by $s(t) = 20 - 16t^2$.

(a) Find the ave. velocity for the time period beginning @ $t = 0.2$s and lasting 0.4s, 0.1s, 0.01s.

(b) estimate the inst. velocity when $t = 0.2$s.

(the previous example makes use of a mathematica example).

There is a connection between tangent lines & local linearity... (thru zooming).

ex 3: (a) $y = x^2$ @ $x = 2$ $\quad (y - 4) = 4(x - 2)$

(b) $y = x - 2\sin x$ @ $x = \frac{\pi}{2}$: $y = x - 2$

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