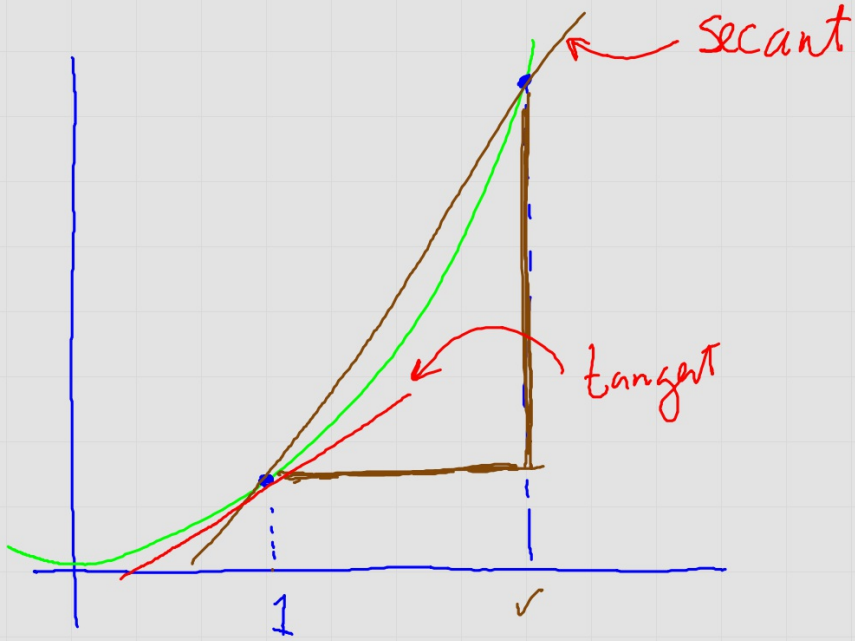
The Tangent and Velocity Problem



Write an eq. tangent to $y = x^2$ at $x = 1$.

$y(1) = 1 \rightarrow (1, 1)$

Any pt. on curve given by (x, x^2)

$$m = \frac{x^2 - 1}{x - 1}$$

x	m
1.500	2.500
1.100	2.100
1.010	2.010
1.001	2.001

x	m
.500	1.500
.900	1.900
.990	1.990
.999	1.999

$$\lim_{x \to 1} \frac{x^2 - 1}{x - 1} = 2$$

$\therefore m = 2$

$$\boxed{\therefore y - 1 = 2(x - 1)}$$

x	0	.100	.200	.300	.400
y	3.860	3.710	3.400	3.020	2.350

Write an eq. of tan at $x = .200$.

$$m = \frac{3.020 - 3.710}{.300 - .100} = -3.450$$

$$\therefore y - 3.400 = -3.450(x - .200)$$

$s(t) = -16t^2 + 630$ vel @ $t = 3$.

$s(3) = 486 \rightarrow (3, 486)$

Any pt on curve: $(t, -16t^2 + 630)$

$$m = \frac{-16t^2 + 630 - 486}{t - 3}$$

t	(m) avg vel
3.500	
3.100	
3.010	
3.001	

$(2, 16) \qquad (t, 40t - 16t^2)$

$$m = \frac{40t - 16t^2 - 16}{t - 2}$$

t	av. vel
2.5	
2.1	