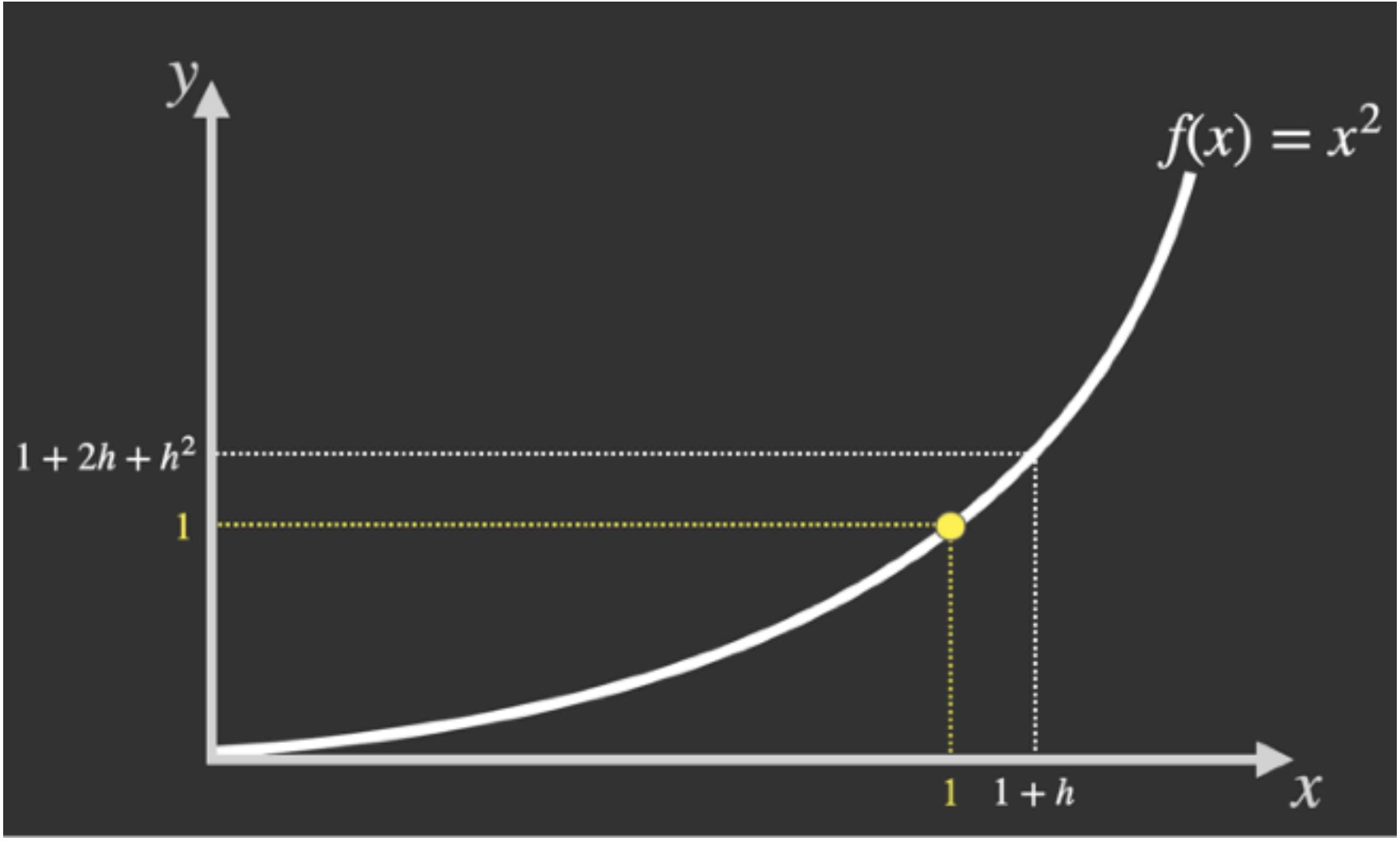
finding the slope at a point


y
f(x) = x^2
1 + 2h + h^2
1
1
1 + h
x

the change = the coefficient of h

finding the slope at a point

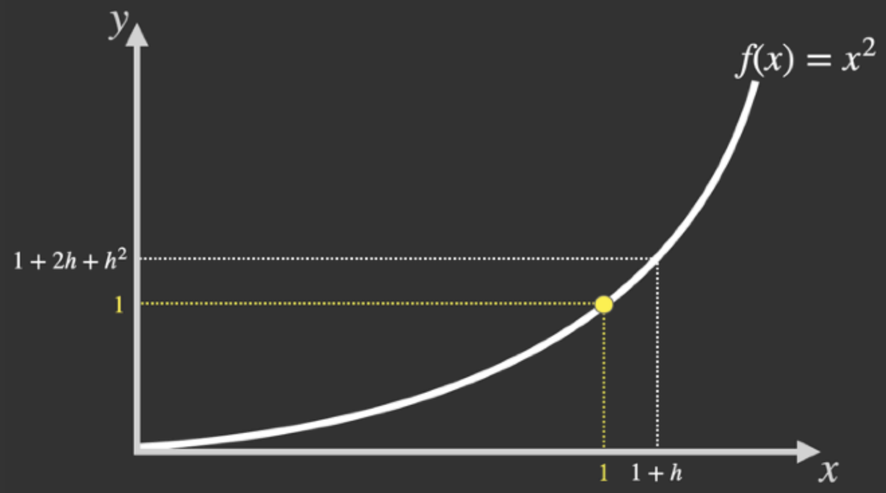
What about when $x = c$?

As x changes from c to $c + h$,

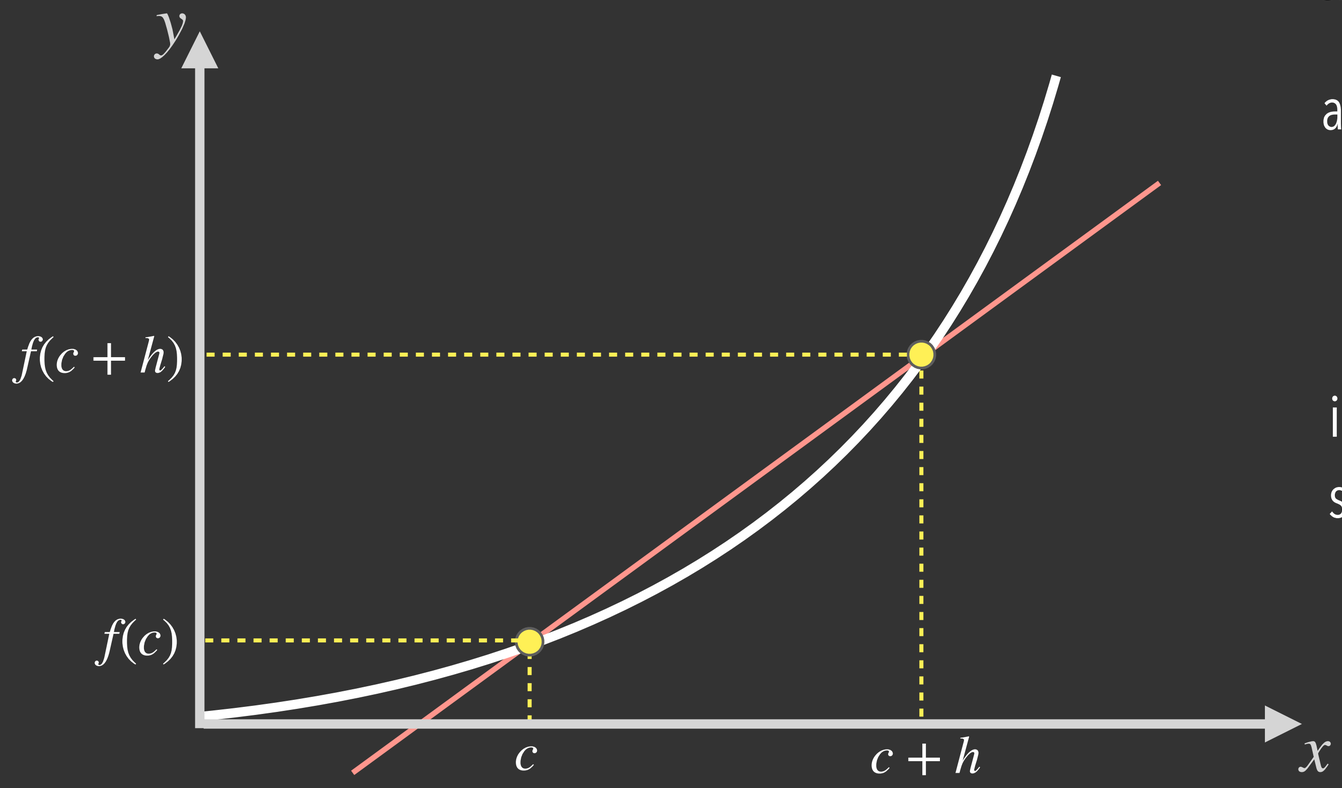
$f(x) = x^2$ changes from c^2 to $(c + h)^2 = c^2 + \underbrace{2ch}_{\text{the change} = \text{the coefficient of } h} + h^2$

$\Longrightarrow$ the derivative of f at c is $2c$

and in general $f'(x) = 2x$



let's generalize



$$\frac{\text{change in } f}{\text{change in } x} = \frac{f(c+h) - f(c)}{(c+h) - c} = \frac{f(c+h) - f(c)}{c}$$

and examine what happens as h approaches 0

$$\lim_{h \to 0} \frac{f(c+h) - f(c)}{c}$$

in the hopes that the slope of the secant will approach the slope of the tangent line