a function f(x) at the rate at which f(x) is changing at x. It is also the slape of the tangent line to the graph of y=f(x) at the point (x, f(x)). The formal definition is lin f(x+h) - f(x) Last home, we considered the function f(x)=x, on 2 re comprised f'(1). Ex: Today, let's compute f(x). f'(x) = lim f(x+h) - f(x) (x+h) $x^2 + 2xh + h^2$ lin Zxh+h

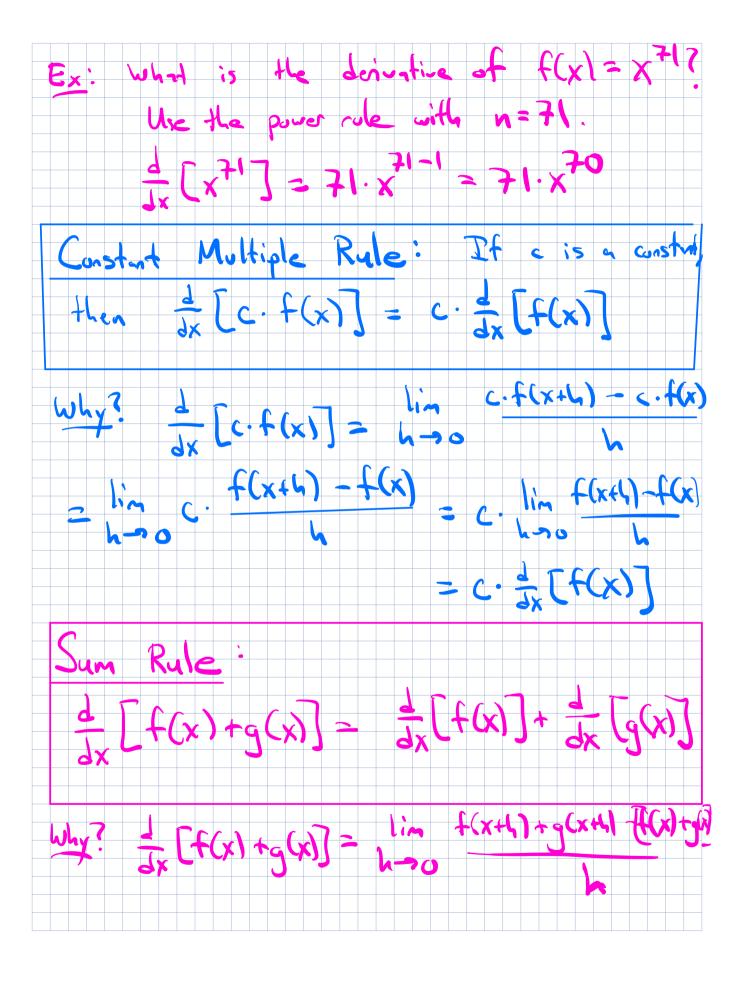
Ex: Let
$$f(x) = x^n$$
 where n is a nonnegative integer.

Compute $f'(x)$.

$$f'(x) = \lim_{h \to 0} f(x+h) - f(x)$$

$$\lim_{h \to 0} (x+h)^n - x^n$$

$$\lim_{h \to 0}$$



$$= \frac{1}{3x} \left[x^{100} \right] + 31 \frac{1}{3x} \left[x^{17} \right] - 3 \frac{1}{3x} \left[x^{3} \right] + \frac{1}{3x} \left[x^{3} \right]$$

$$= 100 \cdot x^{99} + 31 \cdot 17 \times 16 - 3 \cdot 1 + 0$$

$$= 100 \times x^{99} + 527 \times 16 - 3$$
WARNING! Derivative of a product is NOT the poduct of the derivatives!

Ex: $\frac{1}{3x} \left[x^{2} \right] = 2x$
 $\frac{1}{3x} \left[x^{3} \right] = 1$

Wext time, we'll see how to compute the derivative of a product of 2 functions.