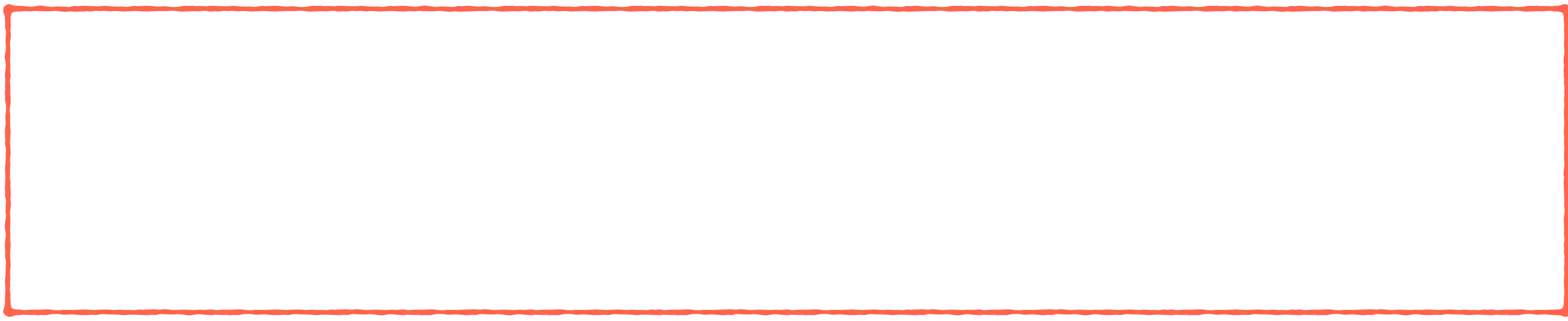




the product rule



example

# the product rule

If  $f$  and  $g$  are differentiable, then

$$\frac{d}{dx} (f(x)g(x)) = f'(x)g(x) + f(x)g'(x)$$

## example

Differentiate the function  $f(x) = (x^2 + 1)(x^3 - 1)$ .

Here we set  $f(x) = x^2 + 1 \implies f'(x) = 2x$

$g(x) = x^3 - 1 \implies g'(x) = 3x^2$

and use the product rule:

$$\begin{aligned} \frac{d}{dx} ((x^2 + 1)(x^3 - 1)) &= 2x(x^3 - 1) + (x^2 + 1)3x^2 \\ &= 2x^4 - 2x + 3x^4 + 3x^2 \\ &= 5x^4 + 3x^2 - 2x \end{aligned}$$

the chain rule