the chain rule

example

exercise 2

the chain rule

To differentiate the function $y(x) = (x^3 + 2x)^{10}$ we can set $f(z) = z^{10}$ and $g(x) = x^3 + 2x$.

We then have that $f'(z) = 10z^9$ and $g'(x) = 3x^2 + 2$. Then

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

$$= \frac{d}{dx}(x^3 + 2x)^{10}$$

$$= f'(g(x))g'(x)$$

$$= 10(x^3 + 2x)^9 \cdot (3x^2 + 2)$$

exercise 2

Differentiate the function $y(x) = \dfrac{1}{x^3}$

a special case: quotient rule