
1. $f(x) = (x^2 + 1)^4$

Strategy: compound function

$$f'(x) = 4(x^2 + 1)^3 \cdot 2x = 8x(x^1 + 1)^3.$$

2. $f(x) = \frac{\ln(3-x)}{x^2+4}$

Strategy: quotient rule; beware that $\ln(3 - x)$ is a compound function!

$$f'(x) = \frac{\frac{1}{3-x} \cdot (-1) \cdot (x^2 + 4) - \ln(3 - x) \cdot 2x}{(x^2 + 4)^2}$$

3. $f(x) = \frac{\sqrt{2+x}}{\sqrt{4x-2}}$

Strategy: quotient rule; beware that both square roots are compound functions!

$$f'(x) = \frac{\frac{1}{2\sqrt{2+x}} \cdot \sqrt{4x-2} - \sqrt{2+x} \cdot \frac{1}{2\sqrt{4x-2}} \cdot 4}{4x-2}$$

4. $f(x) = \log_{10}(x^2 - 1)$

Strategy: compound function

$$f'(x) = \frac{1}{(x^2 - 1) \ln 10} \cdot 2x$$