

The Chain Rule

Solutions should show all of your work, not just a single final answer.

1. State the Chain Rule.
2. Compute the derivative of each function below using differentiation rules.

(a) $f(x) = (x^3 - x + 1)^{10}$

(b) $f(x) = \sqrt{x^3 + 4x}$

(c) $f(x) = e^{-2x} \cos(7x)$

(d) $f(x) = \left(\frac{e^x}{3-x}\right)^8$

(e) $f(x) = \sin^2(x) - \sin(x^2)$

3. Find the derivative of $y = 5^x$ in the following way:
 - (a) Express 5^x as a power of e (think about how to write 5 as a power of e).
 - (b) Now find y' using any differentiation rules you know.

4. T/F (with justification) If $f(x)$ is differentiable, then $\frac{d}{dx}(f(\sqrt{x})) = \frac{f'(x)}{2\sqrt{x}}$.