
The Chain Rule

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

1. Compute the derivative with respect to x of each function below using differentiation rules.

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

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

(c) $f(x) = e^{ax} \cos(bx)$ for constants a and b

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

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

2. Differentiate the following functions **with respect to t** , where r is a function of t .

(a) $(r^2 + 1)^4$

(b) $\sin(2r) - 2 \sin r$

(c) e^{r^2+ar+b} for constants a and b .

3. If $f'(0) = 5$ and $F(x) = f(3x)$, what is $F'(0)$?

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