

# Chain Rule Practice Problems

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## Chain Rule Practice Problems

Differentiate each of the following functions with respect to  $x$  using the chain rule:

1.  $f(x) = (2x + 1)^2$
2.  $f(x) = \sqrt{9x^4 + 3}$
3.  $f(x) = (5x^2 + x - 6)^3$
4.  $f(x) = \sin(5x^3)$
5.  $f(x) = \tan(3x - 2)$
6.  $f(x) = 2 \csc(\sqrt{x})$
7.  $f(x) = e^{3x}$
8.  $f(x) = 2e^{7x-5}$
9.  $f(x) = -5e^{\sin(x)}$
10.  $f(x) = e^{-\cot(5x^2+4)}$
11.  $f(x) = \ln(3x^2)$
12.  $f(x) = \ln(\cos(2x))$
13.  $f(x) = -\ln(7x^6 - 3x + 2)$
14.  $f(x) = \sin^2(e^{3x} + 2)$
15.  $f(x) = e^{\frac{3x(1-x^2)}{2}}$

## Solutions

1.  $f'(x) = 8x + 4$
2.  $f'(x) = \frac{18x^3}{\sqrt{9x^4 + 3}}$
3.  $f'(x) = (30x + 3)(5x^2 + x - 6)^2$
4.  $f'(x) = 15x^2 \cos(5x^3)$
5.  $f'(x) = 3 \sec^2(3x - 2)$
6.  $f'(x) = -\frac{\csc(\sqrt{x}) \cot(\sqrt{x})}{\sqrt{x}}$
7.  $f'(x) = 3e^{3x}$
8.  $f'(x) = 14e^{7x-5}$
9.  $f'(x) = -5e^{\sin(x)} \cos(x)$
10.  $f'(x) = e^{-\cot(5x^2+4)} \cdot 10x \csc^2(5x^2 + 4)$
11.  $f'(x) = \frac{2}{x}$
12.  $f'(x) = -2 \tan(2x)$
13.  $f'(x) = \frac{-42x^5 + 3}{7x^6 - 3x + 2}$
14.  $f'(x) = 6e^{3x} \sin(e^{3x} + 2) \cos(e^{3x} + 2)$
15.  $f'(x) = \frac{3 - 9x^2}{2} \cdot e^{\frac{3x(1-x^2)}{2}}$