

Section 3.6: Chain Rule - Worksheet

1. Calculate the derivatives of the following functions.

(a) $f(x) = 2 \sec(4x^3 + 7)$	(d) $f(x) = 3 \left(\tan\left(\frac{x}{7}\right) + 1 \right)^{21}$	(g) $f(x) = x5^{3x^2}$
(b) $f(x) = 14\sqrt[7]{4x - \sin(5x)}$	(e) $f(x) = \sqrt{25 - 4x^2}$	(h) $f(x) = 6 \cos(x^3 \sin(1 - 2x))$
(c) $f(x) = \cos(x^2) - \cos(x)^2$	(f) $f(x) = e^{5 \cos(3x)}$	(i) $f(x) = \frac{2x}{\sqrt{\cos(3x)}}$

2. Find the x -values of the points on the graph of $f(x) = (2x + 1)e^{-x^2}$ where the tangent line is horizontal.

3. **[Advanced]** Suppose that f is a differentiable function such that

$$\begin{aligned} f(0) &= -1, & f(1) &= 3, & f(2) &= -5, & f(4) &= 7, \\ f'(0) &= -2, & f'(1) &= 4, & f'(2) &= 3, & f'(4) &= -1. \end{aligned}$$

Find an equation of the tangent lines to each of the following functions at the given point.

- (a) $g(x) = f(-2x)$ at $x = -1$.
- (b) $g(x) = f(x^2)$ at $x = 2$.
- (c) $g(x) = \sec\left(\frac{\pi f(x)}{12}\right)$ at $x = 1$.
- (d) $g(x) = f(4x)e^{3x}$ at $x = 0$.