

## Station 2- Chain Rule

Date \_\_\_\_\_ Period \_\_\_\_\_

**Differentiate each function with respect to  $x$ .**

1)  $f(x) = (3x^4 + 5)^5$

2)  $f(x) = (-4x + 1)^{-2}$

3)  $f(x) = (-2x^5 + 3)^{-3}$

4)  $f(x) = (4x - 3)^3$

5)  $f(x) = (-5x^2 - 1)^{\frac{1}{4}}$

6)  $f(x) = (3x^5 - 1)^{-3}$

7)  $f(x) = (4x^5 - 1)^{\frac{1}{2}}$

8)  $f(x) = (3x^5 - 1)^{-4}$

9)  $f(x) = (-3x^2 - 2)^5$

10)  $f(x) = (-5x - 2)^{\frac{1}{2}}$

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Date \_\_\_\_\_ Period \_\_\_\_\_

Differentiate each function with respect to  $x$ .

1)  $f(x) = (3x^4 + 5)^5$

$$\begin{aligned} f'(x) &= 5(3x^4 + 5)^4 \cdot 12x^3 \\ &= 60x^3(3x^4 + 5)^4 \end{aligned}$$

2)  $f(x) = (-4x + 1)^{-2}$

$$\begin{aligned} f'(x) &= -2(-4x + 1)^{-3} \cdot -4 \\ &= \frac{8}{(-4x + 1)^3} \end{aligned}$$

3)  $f(x) = (-2x^5 + 3)^{-3}$

$$\begin{aligned} f'(x) &= -3(-2x^5 + 3)^{-4} \cdot -10x^4 \\ &= \frac{30x^4}{(-2x^5 + 3)^4} \end{aligned}$$

4)  $f(x) = (4x - 3)^3$

$$\begin{aligned} f'(x) &= 3(4x - 3)^2 \cdot 4 \\ &= 12(4x - 3)^2 \end{aligned}$$

5)  $f(x) = (-5x^2 - 1)^{\frac{1}{4}}$

$$\begin{aligned} f'(x) &= \frac{1}{4}(-5x^2 - 1)^{-\frac{3}{4}} \cdot -10x \\ &= -\frac{5x}{2(-5x^2 - 1)^{\frac{3}{4}}} \end{aligned}$$

6)  $f(x) = (3x^5 - 1)^{-3}$

$$\begin{aligned} f'(x) &= -3(3x^5 - 1)^{-4} \cdot 15x^4 \\ &= -\frac{45x^4}{(3x^5 - 1)^4} \end{aligned}$$

7)  $f(x) = (4x^5 - 1)^{\frac{1}{2}}$

$$\begin{aligned} f'(x) &= \frac{1}{2}(4x^5 - 1)^{-\frac{1}{2}} \cdot 20x^4 \\ &= \frac{10x^4}{(4x^5 - 1)^{\frac{1}{2}}} \end{aligned}$$

8)  $f(x) = (3x^5 - 1)^{-4}$

$$\begin{aligned} f'(x) &= -4(3x^5 - 1)^{-5} \cdot 15x^4 \\ &= -\frac{60x^4}{(3x^5 - 1)^5} \end{aligned}$$

9)  $f(x) = (-3x^2 - 2)^5$

$$\begin{aligned} f'(x) &= 5(-3x^2 - 2)^4 \cdot -6x \\ &= -30x(-3x^2 - 2)^4 \end{aligned}$$

10)  $f(x) = (-5x - 2)^{\frac{1}{2}}$

$$\begin{aligned} f'(x) &= \frac{1}{2}(-5x - 2)^{-\frac{1}{2}} \cdot -5 \\ &= -\frac{5}{2(-5x - 2)^{\frac{1}{2}}} \end{aligned}$$