

Introduction to the Chain Rule

Warm-up: Find $\frac{dy}{dx}$

1. $y = (x^2 + 3x)^2$

2. $y = (x^2 + 3x)^3$

3. $y = (x^2 + 3x)^9$

4. $\sqrt{x^2 + 3x}$

Chain Rule – For composite functions (_____)

Chain Rule

Given $h(x) = f(g(x))$

$h'(x) =$

Examples: Find $f'(x)$

1. $f(x) = (2x + 5)^{10}$

2. $f(x) = \frac{1}{4x-3}$

3. $f(x) = (3x^2 - 2x + 1)^3$

4. $f(x) = \frac{2}{x^3+2x-3}$

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Differentiation by the Chain Rule - Homework

Find the derivatives of the following:

1. $y = (3x - 8)^4$

2. $y = (3x^2 + 2)^5$

3. $y = 4(x^2 + x - 1)^{10}$

4. $y = -5(4 - 9x)^{3/2}$

5. $y = \frac{1}{3x - 2}$

6. $y = \frac{-1}{(x^2 - 5x - 6)^2}$

7. $y = \left(\frac{2}{2-x}\right)^2$

8. $y = \frac{4x}{(x+1)^2}$

9. $y = \frac{-3}{(x^3 - x^2 + 3)^3}$

10. $y = x^3(5x - 1)^4$

11. $y = \sqrt{1-t}$

12. $y = \sqrt[3]{3x^3 - 4x + 2}$

13. $y = \frac{2}{\sqrt{2x+3}}$

14. $y = \frac{-1}{\sqrt{x+1}}$

15. $y = \sqrt{\frac{3x}{2x-3}}$