3.5 Chain Rule I

Wednesday, June 12, 2019 7:14 AM

Power Rule: $\#x^{power}$ | Product Rule: (1st)(2nd) | Quotient Rule: $\frac{Top}{Bottom}$ | Chain Rule: $\#(Quantity)^{power}$

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

$f(x) = 5(4x-3)^{2-1} \rightarrow f'(x) = \underbrace{10(4x-3)^{1}}_{\text{Derivative Outer Function}} \cdot \underbrace{4}_{\text{Derivative Inner Function}} = 40(4x-3) = 160x-120$

$f(x) = 5(4x-3)(4x-3)$

$f(x) = 5(16x^2-24x+9)$

$f(x) = 80x^2-120x+45 \rightarrow f'(x) = 160x-120$

Chain Rule:

$f(x) = \#(\text{Polynomial})^{power} \rightarrow f'(x) = (\text{D-OUTER}) \cdot (\text{D-INNER})$

Inner Function / Outer Function

Inner Function does not change

ex $f(x) = 2(4x^3-3x+5)^{3-1} \rightarrow f'(x) = 6(4x^3-3x+5)^{2} \cdot (12x^2-3)$

D-OUTER · D-INNER

ex $f(x) = \sqrt{3x^2+8} = (3x^2+8)^{\frac{1}{2}-1} \rightarrow f'(x) = \frac{1}{2}(3x^2+8)^{-\frac{1}{2}} \cdot (6x)$

D-OUTER · D-INNER

$$\frac{3x}{\sqrt{3x^2+8}}$$