3.4 Product & Quotient Rules

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$\#x^{power}$

Power Rule

Product Rule

$f(x) = (1^{ST}\ Quantity)(2^{ND}\ Quantity)$ $\quad f'(x) = (1^{ST})\cdot(D2^{ND}) + (2^{ND})\cdot(D1^{ST})$

$f(x) = (3x+2)(x^2-4x+5)$ $\quad f'(x) = (3x+2)(2x-4) + (x^2-4x+5)(3)$

FOIL

$3x^3 - 12x^2 + 15x + 2x^2 - 8x + 10$

$f'(x) = \cancel{6x^2} \cancel{-12x} \cancel{+4x} \cancel{-8} + \cancel{3x^2} \cancel{-12x} \cancel{+15}$

$f(x) = 3x^3 - 10x^2 + 7x + 10$

$f'(x) = 9x^2 - 20x + 7$

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Quotient Rule:

$f(x) = \frac{TOP}{BOTTOM}$ $\quad f'(x) = \frac{(BOTTOM)\cdot(D\text{-}TOP) - (TOP)\cdot(D\text{-}BOTTOM)}{(BOTTOM)^2}$

$f(x) = \frac{5x+1}{3x^2+x-4}$ $\quad f'(x) = \frac{(3x^2+x-4)(5) - (5x+1)(6x+1)}{(3x^2+x-4)^2}$

$f'(x) = \frac{15x^2+5x-20 - (30x^2+11x+1)}{(3x^2+x-4)^2}$

$f'(x) = \frac{-15x^2-6x-21}{(3x^2+x-4)^2}$