Derivative Rules

	Function	Derivative	Example	
Constant Function	$y = constant$	$dy/dx = 0$	$y = 7$	$y' = 0$
x	$y = x$	$dy/dx = 1$	$y = x$	$y' = 1$
Power of x Rule	$y = x^n$	$dy/dx = n(x^{n-1})$	$y = x^6$	$y' = 6x^5$
Multiple Rule	$y = k \cdot f(x)$	$dy/dx = k \cdot f'(x)$	$y = 3x^4$	$y' = 12x^3$
Addition and Subtraction Rule	$y = f(x) + g(x)$	$dy/dx = f'(x) + g'(x)$	$y = 3x^2 + 4x$	$y' = 6x + 4$
e^x	$y = e^x$	$dy/dx = e^x$	$y = e^x$	$y' = e^x$
Number raised to a power of x	$y = b^x$	$dy/dx = b^x \ln b$	$y = 3^x$	$y' = 3^x \ln 3$
Natural log of x	$y = \ln x$	$dy/dx = \dfrac{1}{x}$	$y = \ln x$	$y' = \dfrac{1}{x}$
Log of x	$y = \log_b x$	$dy/dx = \dfrac{1}{x (\ln b)}$	$y = \log_4 x$	$y' = \dfrac{1}{x (\ln 4)}$

Product Rule: $y' = (\text{Front})(\text{Back'}) + (\text{Back})(\text{Front'})$

$y = (x^2 + 4)(3x - 5)$ $\qquad$ $y' = (x^2 + 4)(3) + (3x - 5)(2x)$

Quotient Rule: $y' = \dfrac{(\text{Bottom})(\text{Top'}) - (\text{Top})(\text{Bottom'})}{(\text{Bottom})^2}$

$y = \dfrac{(3x - 1)}{(x^2 + 4)}$ $\qquad$ $y' = \dfrac{(x^2 + 4)(3) - (3x - 1)(2x)}{(x^2 + 4)^2}$

Chain Rule: $y' = (\text{Outside'})(\text{Inside'})$

$y = (3x^2 + 5x)^4$ $\qquad$ $y' = 4(3x^2 + 5x)^3(6x + 5)$