

## Derivative Short Cut Rules

Function

Derivative

$$y = x^n$$

$$\frac{dy}{dx} = nx^{n-1}$$

$$y = kf(x)$$

$$\frac{dy}{dx} = kf'(x)$$

$$y = f(x) + g(x)$$

$$\frac{dy}{dx} = f'(x) + g'(x)$$

$$y = f(x) - g(x)$$

$$\frac{dy}{dx} = f'(x) - g'(x)$$

$$y = e^x$$

$$\frac{dy}{dx} = e^x$$

$$y = b^x$$

$$\frac{dy}{dx} = \ln(b)b^x$$

$$y = \ln(x)$$

$$\frac{dy}{dx} = \frac{1}{x}$$

$$y = h(g(x))$$

$$\frac{dy}{dx} = h'(g(x))g'(x)$$

Chain Rule

$$y = f(x)g(x)$$

$$\frac{dy}{dx} = f(x)g'(x) + f'(x)g(x)$$

Product Rule

$$y = \frac{f(x)}{g(x)} = f(x)(g(x))^{-1}$$

$$\frac{dy}{dx} = f(x)(-1)(g(x))^{-2}g'(x) + f'(x)(g(x))^{-1}$$

(Quotient Rule using the Product and Chain Rule)