Formulae and Theorems

Exponential and Logarithmic Function

$$\frac{d}{dx}e^x = e^x$$
$$\frac{d}{dx}\ln x = \frac{1}{x}$$

The Product Rule

$$\frac{d}{dx}\left[f(x)g(x)\right] = f(x)g'(x) + f'(x)g(x)$$

The Quotient Rule

$$\frac{d}{dx} \left[\frac{f(x)}{g(x)} \right] = \frac{g(x)f'(x) - f(x)g'(x)}{\left[g(x)\right]^2}$$

The Chain Rule

$$\frac{d}{dx}f(u(x)) = f'(u(x))\frac{du}{dx}$$

The Chain Rule using the power rule

$$\frac{d}{dx}u(x)^n = nu(x)^{n-1}\frac{du}{dx}$$

The Chain Rule with Exponential Functions

$$\frac{d}{dx}e^{u(x)} = e^{u(x)}\frac{du}{dx}$$

The Chain Rule with Logarithmic Functions

$$\frac{d}{dx}\ln u(x) = \frac{1}{u(x)} \frac{du}{dx}$$