

!!!! Familiarise yourself with this. !!!!
!!!! This is what you will be given in your examination. !!!!

Formulas

Differentiation

We assume that u is a differentiable function of x .

$$\frac{d}{dx}(c) = 0$$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

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

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

$$\frac{d}{dx}[c f(x)] = c f'(x)$$

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

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

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

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

$$\frac{d}{dx}(\log_b u) = \frac{1}{(\ln b)u} \cdot \frac{du}{dx}$$

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

$$\frac{d}{dx}(a^u) = a^u (\ln a) \frac{du}{dx}$$

Integration

$$\int k dx = kx + C$$

$$\int [f(x) \pm g(x)] dx = \int f(x) dx \pm \int g(x) dx$$

$$\int x^n dx = \frac{x^{n+1}}{n+1} + C, \quad n \neq -1$$

$$\int [u(x)]^n du = \frac{u^{n+1}}{n+1} + C$$

$$\int e^x dx = e^x + C$$

$$\int e^u du = e^u + C$$

$$\int k f(x) dx = k \int f(x) dx$$

$$\int \frac{1}{u} du = \ln|u| + C, \quad u \neq 0$$

Least Squares Approximation

$$\hat{y} = \hat{a} + \hat{b}x$$

$$\hat{a} = \frac{\left(\sum_n x_i^2 \right) \left(\sum_n y_i \right) - \left(\sum_n x_i \right) \left(\sum_n x_i y_i \right)}{n \sum_n x_i^2 - \left(\sum_n x_i \right)^2} \quad \text{and}$$

$$\hat{b} = \frac{\sum_n x_i \sum_n y_i - n \sum_n x_i y_i}{\left(\sum_n x_i \right)^2 - n \sum_n x_i^2}$$