

Background Basics Math 2214

Derivative Rules: If u and v are functions of x ,

$$D_x u^n = n u^{n-1} \frac{du}{dx}$$

$$D_x e^u = e^u \frac{du}{dx}$$

$$D_x \ln u = \frac{1}{u} \frac{du}{dx}$$

$$D_x \sin u = \cos u \frac{du}{dx}$$

$$D_x \cos u = -\sin u \frac{du}{dx}$$

$$D_x u v = u v' + u' v$$

$$D_x \frac{u}{v} = \frac{v u' - u v'}{v^2}$$

Standard Integrals: If u and v are functions of x ,

$$\int u^n du = \frac{u^{n+1}}{n+1} + c$$

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

$$\int \frac{1}{u} du = \ln u + c$$

$$\int \sin u du = -\cos u + c$$

$$\int \cos u du = \sin u + c$$

$$\int u dv = u v - \int v du$$

From Integrals Tables:

$$\int u e^{au} du = \frac{a u - 1}{a^2} e^{au} + c \quad \int u \sin u du = \sin u - u \cos u + c$$

Properties of Exponential and Log Functions:

$$\ln e^u = u$$

$$e^{\ln u} = u$$

$$\ln a^b = b \ln a$$

$$\ln ab = \ln a + \ln b$$

$$\ln \left(\frac{a}{b} \right) = \ln a - \ln b$$