Leibnitz's Rule.

(1) If f(x) is continuous and u(x), v(x) are differentiable functions in the interval [a, b], then,

$$\frac{d}{dx}\int_{u(x)}^{v(x)} f(t)dt = f\{v(x)\}\frac{d}{dx}\{v(x)\} - f\{u(x)\}\frac{d}{dx}\{u(x)\}$$

(2) If the function $\phi(x)$ and $\psi(x)$ are defined on [a,b] and differentiable at a point $x \in (a,b),$ and $f(x,t)$ is continuous, then, $\frac{d}{dx}\left[\int_{\phi(x)}^{\psi(x)} f(x,t)dt\right]$

$$= \int_{\phi(x)}^{\psi(x)} \frac{d}{dx} f(x,t)\,dt + \left\{\frac{d\,\psi(x)}{dx}\right\} f(x,\psi(x)) - \left\{\frac{d\,\phi(x)}{dx}\right\} f(x,\phi(x))$$