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

$$\frac{d}{dx}(\sin U) = \cos(u) \cdot U'$$

$$\frac{d}{dx}(\cos U) = -\sin(u) \cdot u'$$

$$\frac{d}{dx}(\tan U) = \sec^2(u) \cdot u'$$

$$\frac{d}{dx}(\cot u) = -\cos^2(u) \cdot u'$$

$$\frac{d}{dx}(\sec u) = \sec(u)\tan(u) \cdot$$

$$\frac{d}{dx}(\csc u) = -\csc(u)\cot(u) \cdot u'$$

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

$$\frac{d}{dx}[\log_a u] = \frac{u'}{u \ln a}$$

$$\frac{d}{dx}[e^x] = e^x \cdot x'$$

$$\frac{d}{dx}[e^{2x}] = 2e^{2x}$$

$$\frac{d}{dx}[x \cdot y] = x'y + xy' \quad (\text{Product rule})$$

$$\frac{d}{dx}\left[\frac{U}{V}\right] = \frac{vu' - uv'}{v^2} \quad (\text{Quotient rule})$$

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

$$\frac{d}{dx}\sin(x^3) = \cos(x^3) \cdot 3x^2$$

$$\frac{d}{dx}\left[\log_2 x^5\right]$$
$$= \frac{5x^4}{x^5 \ln 2} = \frac{5}{x \ln 2}$$

$$\frac{d}{dx}(\ln x^3) = \frac{d}{dx}(3 \ln x)$$
$$= 3 \cdot \frac{1}{x}$$

$$\frac{d}{dx}\left[\ln(x^4 - x^5)\right]$$
$$u = x^4 - x^5$$
$$u' = 4x^3 - 5x^4$$
$$\Rightarrow \frac{4x^3 - 5x^4}{x^4 - x^5}$$

$$\frac{d}{dx}(\ln \tan x) = \frac{\sec^2 x}{\tan x}$$
$$\frac{\frac{1}{\cos^2}}{\frac{\sin}{\cos}} \Rightarrow \frac{1}{\sin x \cos x}$$
$$= \cos x \cdot \sin x$$

Logaeulthm

$$\log_x 8 = 3 \qquad \log_3 27 = 3$$

$$\Rightarrow x^3 = 8$$
$$x = 2$$

$$\ln_e (1) = 0 \qquad \ln_e e = 1$$

$$\ln_e 5 = \ln 5$$

$$\ln e^7 = 7 \ln e$$
$$= 7 \cdot (1)$$

$$e^{\ln 8} = 8$$

$$e^{\ln x^3} = x^3$$

$$e^{\ln y} = e^{\ln y^7} = y^7$$