DIFFERENTATION FORMULAS

$\frac{d}{dx}k = 0$ k is a constant

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

$\frac{d}{dx}k * f(x) = k * f'(x)$ k is a constant

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

$\frac{d}{dx}[f(x)]^n = n[f(x)]^{n-1} * f'(x)$

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

$\frac{d}{dx}e^{f(x)} = e^{f(x)} * f'(x)$

$\frac{d}{dx}\ln x = \frac{1}{x}, \quad x > 0$

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

Product Rule:

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

Quotient Rule:

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

Trigonometric Functions:

$\frac{d}{dx}\sin x = \cos x$ $\frac{d}{dx}\sec x = \sec x \tan x$ $\frac{d}{dx}\sin f(x) = [\cos f(x)]f'(x)$

$\frac{d}{dx}\cos x = -\sin x$ $\frac{d}{dx}\csc x = -\csc x \cot x$ $\frac{d}{dx}\cos f(x) = [-\sin f(x)]f'(x)$

$\frac{d}{dx}\tan x = \sec^2 x$ $\frac{d}{dx}\cot x = -\csc^2 x$ $\frac{d}{dx}\tan f(x) = [\sec^2 f(x)]f'(x)$

Revised Summer 2005
Student Learning Assistance Center (SLAC)
Texas State University--San Marcos