Differentiation rules

$\frac{d}{dx} f[g(x)]^n = n \cdot f[g(x)]^{n-1} \cdot f'[g(x)] \cdot g'(x)$ ← Chain rule

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

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

$\frac{d}{dx} [g(x)]^n = n[g(x)]^{n-1} \cdot g'(x)$ ← Power rule

— —

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

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

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

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

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

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

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

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

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

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

Integration rules

$\int x^n dx = \frac{x^{n+1}}{n+1} + c \leftarrow$ Power rule

$\int u \cdot v` \, dx = uv - \int vu` dx \leftarrow$ By parts rule (+LIATE)

$\int a^x dx = \frac{a^x}{ln\, a} + c$

$\int x^{-1} dx = lnx + c$

$\int sinx \, dx = \; - cosx + c$

$\int cosx \, dx = sinx + c$

$\int tanx \, dx = ln|secx| + c$

$\int cscx \, dx = \; - ln|cscx + cotx| + c$

$\int secx \, dx = ln|secx + tanx| + c$

$\int cotx \, dx = ln|sinx| + c$

$\int lnx \, dx = x(lnx - 1) + c$