Basic Properties of Derivatives

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

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

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

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

Quotient: $\frac{d}{dx}\left[\frac{f(x)}{g(x)}\right] = \left[\frac{f(x)}{g(x)}\right]' = \frac{f'(x)\cdot g(x) - g'(x)\, f(x)}{(g(x))^2} = \frac{\frac{d}{dx}f(x)\cdot g(x) - \frac{d}{dx}g(x)\cdot f(x)}{(g(x))^2}$

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

Basic Properties of Integrals:

Addition: $\int[f(x)+g(x)]dx = \int f(x)\,dx + \int g(x)\,dx$

Subtraction: $\int[f(x)-g(x)]dx = \int f(x)\,dx - \int g(x)\,dx$

Coefficient: $\int c\cdot f(x)\,dx = c\cdot\int f(x)\,dx$

Substitution: $\int f(g(x))\cdot g'(x)\,dx = \int f(u)\,du,\ u=g(x)$

Common Derivatives

Constant: $\frac{d}{dx}(k) = 0$ k is a constant

Power: $\frac{d}{dx}(x^n) = n x^{n-1}$ n is a constant

Trig.: $\frac{d}{dx}(\sin(x)) = \cos(x)$

$\frac{d}{dx}(\cos(x)) = -\sin(x)$

$\frac{d}{dx}(\tan(x)) = \sec^2(x)$

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

$\frac{d}{dx}(\csc(x)) = -\csc(x)\cot(x)$

Basic Integrals

Constant: $\int k\,dx = kx + c$

Power: $\int x^n\,dx = \frac{1}{n+1}\cdot x^{n+1} + c$

Trig: $\int \sin(x)\,dx = -\cos(x) + c$

$\int \cos(x)\,dx = \sin(x) + c$

$\int \sec^2(x)\,dx = \tan(x) + c$

$\int \sec(x)\tan(x)\,dx = \sec(x) + c$

$\int \csc(x)\cot(x)\,dx = -\csc(x) + c$