DERIVATIVE FORMULAS

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$\frac{d}{dx} c = 0$, c a constant	$\frac{d}{dx}(u \pm v) = \frac{du}{dx} \pm \frac{dv}{dx}$
$\frac{d}{dx} u^n = nu^{n-1} \frac{du}{dx}$	$\frac{d}{dx}(uv) = u\frac{dv}{dx} + v\frac{du}{dx}$
$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$	$\frac{dy}{dx} = \frac{dy}{du} \bullet \frac{du}{dx}$, $y = f(u)$, $u = g(x)$
$\frac{d}{dx} \sin u = \cos u \frac{du}{dx}$	$\frac{d}{dx} \cos u = - \sin u \frac{du}{dx}$
$\frac{d}{dx} \tan u = \sec^2 u \frac{du}{dx}$	$\frac{d}{dx} \cot u = - \csc^2 u \frac{du}{dx}$
$\frac{d}{dx} \sec u = \sec u \tan u \frac{du}{dx}$	$\frac{d}{dx} \csc u = - \csc u \cot u \frac{du}{dx}$
$\frac{d}{dx} \log_a u = \frac{1}{u} \log_a e \frac{du}{dx} = \frac{1}{u \ln a} \frac{du}{dx}$	$\frac{d}{dx} \ln u = \frac{1}{u} \frac{du}{dx}$
$\frac{d}{dx} a^u = a^u \ln a \frac{du}{dx}$	$\frac{d}{dx} e^u = e^u \frac{du}{dx}$
$\frac{d}{dx} \sinh u = \cosh u \frac{du}{dx}$	$\frac{d}{dx} \cosh u = \sinh u \frac{du}{dx}$
$\frac{d}{dx} \tanh u = \operatorname{sech}^2 u \frac{du}{dx}$	$\frac{d}{dx} \coth u = - \operatorname{csch}^2 u \frac{du}{dx}$
$\frac{d}{dx} \operatorname{sech} u = - \operatorname{sech} u \tanh u \frac{du}{dx}$	$\frac{d}{dx} \operatorname{csch} u = - \operatorname{csch} u \coth u \frac{du}{dx}$
$\frac{d}{dx} \arcsin u = \frac{1}{\sqrt{1-u^2}} \frac{du}{dx}$	$\frac{d}{dx} \arccos u = \frac{-1}{\sqrt{1-u^2}} \frac{du}{dx}$
$\frac{d}{dx} \arctan u = \frac{1}{1+u^2} \frac{du}{dx}$	$\frac{d}{dx} \operatorname{arccot} u = \frac{-1}{1+u^2} \frac{du}{dx}$
$\frac{d}{dx} \operatorname{arcsec} u = \frac{1}{\lvert u \rvert \sqrt{u^2-1}} \frac{du}{dx}$	$\frac{d}{dx} \operatorname{arccsc} u = \frac{-1}{\lvert u \rvert \sqrt{u^2-1}} \frac{du}{dx}$
$\frac{d}{dx} \sinh^{-1} u = \frac{1}{\sqrt{1+u^2}} \frac{du}{dx}$	$\frac{d}{dx} \cosh^{-1} u = \frac{\pm 1}{\sqrt{u^2-1}} \frac{du}{dx}$
$\frac{d}{dx} \tanh^{-1} u = \frac{1}{1-u^2} \frac{du}{dx}$	$\frac{d}{dx} \coth^{-1} u = \frac{1}{1-u^2} \frac{du}{dx}$
$\frac{d}{dx} \operatorname{sech}^{-1} u = \frac{\mp 1}{u\sqrt{1-u^2}} \frac{du}{dx}$	$\frac{d}{dx} \operatorname{csch}^{-1} u = \frac{-1}{u\sqrt{1+u^2}} \frac{du}{dx}$, $u > 0$ $\frac{1}{u\sqrt{1+u^2}} \frac{du}{dx}$, $u < 0$
$\frac{d}{dx} \lvert u \rvert = \frac{u}{\lvert u \rvert} \frac{du}{dx}$	

INTEGRAL FORMULAS

$\int kf(u)\,du = k\int f(u)\,du$	$\int [f(u) \pm g(u)]\,du = \int f(u)\,du \pm \int g(u)\,du$
$\int du = u + C$	$\int u^n du = \frac{u^{n+1}}{n+1} + C, \quad n \neq -1$
$\int e^u du = e^u + C$	$\int a^u du = a^u \log_a e + C = \frac{a^u}{\ln a} + C$
$\int \frac{du}{u} = \ln\|u\| + C$	$\int u\,dv = uv - \int v\,du$
$\int \sin u\,du = -\cos u + C$	$\int \cos u\,du = \sin u + C$
$\int \tan u\,du = -\ln\|\cos u\| + C$	$\int \cot u\,du = \ln\|\sin u\| + C$
$\int \sec u\,du = \ln\|\sec u + \tan u\| + C$	$\int \csc u\,du = -\ln\|\csc u + \cot u\| + C$
$\int \sec^2 u\,du = \tan u + C$	$\int \csc^2 u\,du = -\cot u + C$
$\int \sec u \tan u\,du = \sec u + C$	$\int \csc u \cot u\,du = -\csc u + C$
$\int \sinh u\,du = \cosh u + C$	$\int \cosh u\,du = \sinh u + C$
$\int \tanh u\,du = \ln(\cosh u) + C$	$\int \coth u\,du = \ln(\sinh u) + C$
$\int \operatorname{sech} u\,du = 2\tan^{-1} e^u + C$	$\int \operatorname{csch} u\,du = \ln(\tanh u/2) + C$
$\int \operatorname{sech}^2 u\,du = \tanh u + C$	$\int \operatorname{csch}^2 u\,du = -\coth u + C$
$\int \operatorname{sech} u \tanh u\,du = -\operatorname{sech} u + C$	$\int \operatorname{csch} u \coth u\,du = -\operatorname{csch} u + C$

$\int \frac{du}{a^2+u^2} = \frac{1}{a}\arctan\frac{u}{a} + C$	$\int \frac{du}{a^2-u^2} = \frac{1}{2a}\ln\left\|\frac{a+u}{a-u}\right\| + C$	$\int \ln x\,dx = x\ln x - x + C$

$\int \frac{du}{u\sqrt{u^2-a^2}} = \frac{1}{a}\operatorname{arcsec}\frac{\|u\|}{a} + C$	$\int \frac{du}{u\sqrt{a^2 \pm u^2}} = -\frac{1}{a}\ln\frac{a+\sqrt{a^2 \pm u^2}}{\|u\|} + C$
$\int \sqrt{u^2 \pm a^2}\,du = \frac{1}{2}\left(u\sqrt{u^2 \pm a^2} \pm a^2 \ln\left\|u + \sqrt{u^2 \pm a^2}\right\|\right) + C$	$\int \frac{du}{\sqrt{a^2-u^2}} = \arcsin\frac{u}{a} + C$
$\int \sqrt{a^2 - u^2}\,du = \frac{1}{2}\left(u\sqrt{a^2-u^2} + a^2 \arcsin\frac{u}{a}\right) + C$	$\int \frac{du}{\sqrt{u^2 \pm a^2}} = \ln\left\|u + \sqrt{u^2 \pm a^2}\right\| + C$
$\int_0^{\pi/2} \cos^n x\,dx = \left(\frac{2}{3}\right)\left(\frac{4}{5}\right)\cdots\left(\frac{n-1}{n}\right)$, n odd, ≥ 3	$\int_0^{\pi/2} \cos^n x\,dx = \left(\frac{1}{2}\right)\left(\frac{3}{4}\right)\cdots\left(\frac{n-1}{n}\right)\left(\frac{\pi}{2}\right)$, n even, ≥ 2

Trigonometric Substitution

$\sqrt{a^2-u^2}$ $u = a\sin\theta$ $du = a\cos\theta$ $\sqrt{a^2-u^2} = a\cos\theta$	$\sqrt{a^2+u^2}$ $u = a\tan\theta$ $du = a\sec^2\theta$ $\sqrt{a^2+u^2} = a\sec\theta$	$\sqrt{u^2-a^2}$ $u = a\sec\theta$ $du = a\sec\theta\tan\theta$ $\sqrt{u^2-a^2} = \pm a\tan\theta$ + if $u > a$, – if $u < -a$