

DERIVATIVE FORMULAS

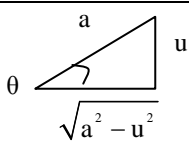
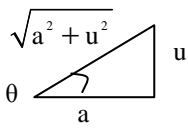
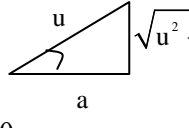
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$\frac{d}{dx} c = 0, c \text{ a constant}$	$\frac{d}{dx} (u \pm v) = \frac{du}{dx} \pm \frac{dv}{dx}$
$\frac{d}{dx} u^n = nu^{n-1} \frac{du}{dx}$	$\frac{d}{dx} (uv) = u \frac{dv}{dx} + v \frac{du}{dx}$
$\frac{d}{dx} \left(\frac{u}{v} \right) = \frac{v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

INTEGRAL FORMULAS

$\int kf(u) du = k \int f(u) du$	$\int [f(u) \pm g(u)] du = \int f(u) du \pm \int g(u) du$	
$\int du = u + C$	$\int u^n du = \frac{u^{n+1}}{n+1} + C, n \neq -1$	
$\int e^u du = e^u + C$	$\int a^u du = a^u \log_a e + C = \frac{a^u}{\ln a} + C$	
$\int \frac{du}{u} = \ln u + C$	$\int u dv = uv - \int v du$	
$\int \sin u du = -\cos u + C$	$\int \cos u du = \sin u + C$	
$\int \tan u du = -\ln \cos u + C$	$\int \cot u du = \ln \sin u + C$	
$\int \sec u du = \ln \sec u + \tan u + C$	$\int \csc u du = -\ln \csc u + \cot u + C$	
$\int \sec^2 u du = \tan u + C$	$\int \csc^2 u du = -\cot u + C$	
$\int \sec u \tan u du = \sec u + C$	$\int \csc u \cot u du = -\csc u + C$	
$\int \sinh u du = \cosh u + C$	$\int \cosh u du = \sinh u + C$	
$\int \tanh u du = \ln(\cosh u) + C$	$\int \coth u du = \ln(\sinh u) + C$	
$\int \operatorname{sech} u du = 2 \tan^{-1} e^u + C$	$\int \operatorname{csch} u du = \ln(\tanh u/2) + C$	
$\int \operatorname{sech}^2 u du = \tanh u + C$	$\int \operatorname{csch}^2 u du = -\coth u + C$	
$\int \operatorname{sech} u \tanh u du = -\operatorname{sech} u + C$	$\int \operatorname{csch} u \coth u du = -\operatorname{csch} u + C$	
$\int \frac{du}{a^2 + u^2} = \frac{1}{a} \arctan \frac{u}{a} + C$	$\int \frac{du}{a^2 - u^2} = \frac{1}{2a} \ln \left \frac{a+u}{a-u} \right + C$	$\int \ln x dx = x \ln x - x + C$
$\int \frac{du}{u\sqrt{u^2 - a^2}} = \frac{1}{a} \operatorname{arcsec} \frac{ u }{a} + C$	$\int \frac{du}{u\sqrt{a^2 \pm u^2}} = -\frac{1}{a} \ln \frac{a + \sqrt{a^2 \pm u^2}}{ u } + C$	
$\int \sqrt{u^2 \pm a^2} du = \frac{1}{2} \left(u\sqrt{u^2 \pm a^2} \pm a^2 \ln \left u + \sqrt{u^2 \pm a^2} \right \right) + C$		$\int \frac{du}{\sqrt{a^2 - u^2}} = \arcsin \frac{u}{a} + C$
$\int \sqrt{a^2 - u^2} du = \frac{1}{2} \left(u\sqrt{a^2 - u^2} + a^2 \arcsin \frac{u}{a} \right) + C$	$\int \frac{du}{\sqrt{u^2 \pm a^2}} = \ln \left u + \sqrt{u^2 \pm a^2} \right + C$	
$\int_0^{\pi/2} \cos^n x dx = \left(\frac{2}{3}\right)\left(\frac{4}{5}\right)\dots\left(\frac{n-1}{n}\right), n \text{ odd}, \geq 3$ $\int_0^{\pi/2} \cos^n x dx = \left(\frac{1}{2}\right)\left(\frac{3}{4}\right)\dots\left(\frac{n-1}{n}\right)\left(\frac{\pi}{2}\right), n \text{ even}, \geq 2$		

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 $u < -a$ 
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