PHYSICS PHOR PHUN
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Calculus

MATH AND SCIENCE TUTORING
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Trignometric derivatives and integrals

Trig Functions	**sin *u***	$\frac{d}{dx}\sin u = \cos u \frac{du}{dx}$	$\int \cos u \, du = \sin u + C$
	cos *u*	$\frac{d}{dx}\cos u = -\sin u \frac{du}{dx}$	$\int \sin u \, du = -\cos u + C$
	tan *u*	$\frac{d}{dx}\tan u = \sec^2 u \frac{du}{dx}$	$\int \sec^2 u \, du = \tan u + C$
	cot *u*	$\frac{d}{dx}\cot u = -\csc^2 u \frac{du}{dx}$	$\int \csc^2 u \, du = -\cot u + C$
	sec *u*	$\frac{d}{dx}\sec u = \sec u \tan u \frac{du}{dx}$	$\int \sec u \tan u \, du = \sec u + C$
	csc *u*	$\frac{d}{dx}\csc u = -\csc u \cot u \frac{du}{dx}$	$\int \csc u \tan u \, dx = -\csc u + C$
Inverse Trig Functions	**sin^{-1} *u***	$\frac{d}{dx}\sin^{-1} u = \frac{1}{\sqrt{1-u^2}}\frac{du}{dx}$	$\int \frac{1}{\sqrt{1-u^2}} du = \sin^{-1} u + C$
	cos^{-1} *u*	$\frac{d}{dx}\cos^{-1} u = -\frac{1}{\sqrt{1-u^2}}\frac{du}{dx}$	$\int \frac{1}{\sqrt{1-u^2}} du = -\cos^{-1} u + C$
	tan^{-1} *u*	$\frac{d}{dx}\tan^{-1} u = \frac{1}{1+u^2}\frac{du}{dx}$	$\int \frac{1}{1+u^2} du = \tan^{-1} u + C$
	cot^{-1} *u*	$\frac{d}{dx}\cot^{-1} u = -\frac{1}{1+u^2}\frac{du}{dx}$	$\int \frac{1}{1+u^2} du = -\cot^{-1} u + C$
	sec^{-1} *u*	$\frac{d}{dx}\sec^{-1} u = \frac{1}{u\sqrt{u^2-1}}\frac{du}{dx}$	$\int \frac{1}{u\sqrt{1-u^2}} du = \sec^{-1} u + C$
	csc^{-1} *u*	$\frac{d}{dx}\csc^{-1} u = -\frac{1}{u\sqrt{u^2-1}}\frac{du}{dx}$	$\int \frac{1}{u\sqrt{1-u^2}} du = -\csc^{-1} u + C$
Hyperbolic Functions	**sinh *x***	$\frac{d}{dx}\sinh u = \cosh u \frac{du}{dx}$	$\int \sinh u \, du = \cosh u + C$
	cosh *x*	$\frac{d}{dx}\cosh u = \sinh u \frac{du}{dx}$	$\int \cosh u \, du = -\sinh u + C$
	tanh *x*	$\frac{d}{dx}\tanh u = \operatorname{sech}^2 u \frac{du}{dx}$	$\int \operatorname{sech}^2 u \, du = \tanh u + C$
	coth *x*	$\frac{d}{dx}\coth u = -\operatorname{csch}^2 u \frac{du}{dx}$	$\int \operatorname{csch}^2 u \, du = -\coth u + C$
	sech *x*	$\frac{d}{dx}\operatorname{sech} u = -\operatorname{sech} u \tanh u \frac{du}{dx}$	$\int \operatorname{sech} u \tanh u \, du = -\operatorname{sech} u + C$
	csch *x*	$\frac{d}{dx}\operatorname{csc} u = -\operatorname{csch} u \coth u \frac{du}{dx}$	$\int \operatorname{csch} u \tanh u \, dx = -\operatorname{csch} u + C$
Inverse Hyperbolic Functions	**sinh^{-1} *x***	$\frac{d}{dx}\sinh^{-1} x = \frac{1}{\sqrt{1+x^2}}$	$\int \frac{1}{\sqrt{1+u^2}} du = \sinh^{-1} u + C$
	cosh^{-1} *x*	$\frac{d}{dx}\cosh^{-1} x = \frac{1}{\sqrt{x^2-1}}$	$\int \frac{1}{\sqrt{u^2-1}} du = -\cosh^{-1} u + C, \ \{u > 1$
	tanh^{-1} *x*	$\frac{d}{dx}\tanh^{-1} x = \frac{1}{1-x^2}, \quad \{\lvert x\rvert < 1$	$\int \frac{1}{1-u^2} du = \tanh^{-1} u + C, \quad \{\lvert u\rvert < 1$
	coth^{-1} *x*	$\frac{d}{dx}\coth^{-1} x = \frac{1}{1-x^2}, \quad \{\lvert x\rvert > 1$	$\int \frac{1}{1-u^2} du = -\coth^{-1} u + C, \quad \{\lvert u\rvert > 1$
	sech^{-1} *x*	$\frac{d}{dx}\operatorname{sech}^{-1} x = -\frac{1}{x\sqrt{1-x^2}}, \quad \{0 < x < 1$	$\int \frac{1}{u\sqrt{1-u^2}} du = -\operatorname{sech}^{-1}\lvert u\rvert + C$
	csch^{-1} *x*	$\frac{d}{dx}\operatorname{sech}^{-1} x = \frac{1}{\lvert x\rvert\sqrt{1+x^2}}, \quad \{x \neq 0$	$\int \frac{1}{u\sqrt{1+u^2}} du = -\operatorname{csch}^{-1}\lvert u\rvert + C$