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Trigonometry and identities

Common trigonometry formulas	
variations on the Pythagorean theorem:	$\sin^2 A + \cos^2 A = 1$ $\tan^2 A + 1 = \sec^2 A$ $1 + \cot^2 A = \csc^2 A$
half-angle formulas:	$\sin^2\left(\frac{A}{2}\right) = \frac{1 - \cos A}{2}$ $\cos^2\left(\frac{A}{2}\right) = \frac{1 + \cos A}{2}$
double-angle formulas:	$\sin(2A) = 2\sin A \cos A$ $\cos(2A) = \cos^2 A - \sin^2 A$
addition formulas:	$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$ $\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$
law of sines:	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$
law of cosines:	$c^2 = a^2 + b^2 - 2ab\cos C$ $b^2 = a^2 + c^2 - 2ac\cos B$ $a^2 = b^2 + c^2 - 2bc\cos A$

$$\cos^2(\theta) = \frac{\cos(2\theta) + 1}{2}$$

$$\sin^2(\theta) = \frac{1 - \cos(2\theta)}{2}$$

Common formulas:

$$alnx = \ln(x^a)$$

$$\log_a b = \frac{\log_c b}{\log_c a}$$

$$e^{lnx} = x$$

$$x^3 \pm a^3 = (x \pm a)(x^2 \mp x + a^2)$$

List of common integrals and derivatives:

Integral $\int ⬚$	Base formula	Derivative
$-\cos(x) + C$	$\sin(x)$	$\cos(x)\, dx$
$\sin(x) + C$	$\cos(x)$	$-\sin(x)\, dx$
$\ln(\lvert\sec(x)\rvert⬚) + C$, or -ln(|cos(x)|)+C	$\tan(x)$	$\sec^2(x)dx$
$\tan(x) - x + C$	$\tan^2(x)$	
$-\ln(\lvert\csc(x) + \cot(x)\rvert + C$	$\csc(x)$	$-\csc(x)\cot(x)\, dx$
$\ln\lvert\sec x + \tan x\rvert + C$	$\sec(x)$	$\sec(x)\tan(x)\, dx$
$\mathbf{\ln\lvert\sin(x)\rvert + C}$	$\cot(x)$	$-\csc^2(x)dx$
$\frac{x^{n+1}}{n+1} + C$	x^n	$nx^{n-1}dx$
$e^x + C$	e^x	$e^x dx$
$\frac{a^x}{\ln(a)} + C$	a^x	$\ln(a)\, a^x dx$
$xln(x) - x + C$	$\ln(x)$	$\frac{dx}{x}$
$xln(ax) - x + C$	$\ln(ax)$	$\frac{a}{ax}dx = \frac{dx}{x}$

$x\log_a x - \frac{x}{\ln(x)} + C$	$\log_a x$	$\frac{dx}{x\ln(a)}$
	$\arcsin(x)$	$\frac{dx}{\sqrt{1-x^2}}$
	$\arccos(x)$	$-\frac{dx}{\sqrt{1-x^2}}$
	$\operatorname{arcsec}(x)$	$\frac{1}{x^2\sqrt{1-\frac{1}{x^2}}}$
	$\frac{1}{a}\operatorname{arcsec}(ax)$	$\frac{dx}{x^2\sqrt{1-\frac{1}{a^2x^2}}}$
$x\arctan(x) - \frac{1}{2}\ln\lvert x^2+1\rvert + C$	$\arctan(x)$	$\frac{dx}{1+x^2}$
	$\arctan(\frac{x}{a})$	$\frac{1}{a} * \frac{dx}{a^2+x^2}$
$x\operatorname{arccot}(x) + \frac{1}{2}\ln\lvert x^2+1\rvert + C$	$\operatorname{arccot}(x)$	$-\frac{dx}{1+x^2}$

Limits:

$\lim x \to 0$	$\frac{\sin(x)}{x} = 1$
$\lim x \to 0$	$\frac{1-\cos(x)}{x^2} = \frac{1}{2}$
$\lim x \to \infty$	$\left(1+\frac{a}{x}\right)^x = e^a$
$\lim x \to \infty$	$cr^{an} = \frac{a_{1st}}{1-r^a}$ See Geometric series
$\lim x \to 0$	$(1+x)^{\frac{1}{x}} = e$
$\lim x \to \infty$	$\left(1+\frac{a}{n}\right)^n = e^a$

$\lim x \to 0$	$\frac{\tan(x)}{x} = 1$
$\lim x \to 0$	$\frac{\arcsin(x)}{\mathrm{x}} = 1$
$\lim x \to 0$	$\frac{e^x - 1}{x} = 1$
$\lim x \to 0$	$\frac{a^x - 1}{x} = \ln(a)$
$\lim x \to 0$	$\frac{\sqrt[n]{1+x} - 1}{x} = \frac{1}{n}$
$\lim x \to 0$	$\frac{\ln(1+x)}{x} = 1$
$\lim x \to \infty$	$x^{\frac{1}{x}} = 1$

$$\lim_{n\to\infty} n^{\frac{1}{n}} = 1$$

$$0! = 1$$

$$0^0 = 1$$