

Good to Know for Math 201

Trigonometric Identities

$\cot x = \frac{1}{\tan x}$ $\sec x = \frac{1}{\cos x}$ $\csc x = \frac{1}{\sin x}$	$\sin^2 x + \cos^2 x = 1$ $1 + \tan^2 x = \sec^2 x$ $1 + \cot^2 x = \csc^2 x$	$\sin 2x = 2 \sin x \cos x$ $\cos 2x = \cos^2 x - \sin^2 x$ $\sin^2 x = \frac{1 - \cos 2x}{2}$ $\cos^2 x = \frac{1 + \cos 2x}{2}$	
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Derivatives

$\frac{d}{dx}[x^n] = nx^{n-1}$ $\frac{d}{dx}[\ln x] = \frac{1}{x}$ $\frac{d}{dx}[e^x] = e^x$	$\frac{d}{dx}[\sin x] = \cos x$ $\frac{d}{dx}[\cos x] = -\sin x$ $\frac{d}{dx}[\tan x] = \sec^2 x$ $\frac{d}{dx}[\sec x] = \sec x \tan x$	$a^x := e^{x \ln a}$ $\log_a x := \frac{\ln x}{\ln a}$ $\frac{d}{dx}[a^x] = a^x \ln a$ $\frac{d}{dx}[\log_a x] = \frac{1}{x \ln a}$
$(uv)' = u'v + uv'$	$\left(\frac{u}{v}\right)' = \frac{u'v - uv'}{v^2}$	$[v(u)]' = v'(u) u'$

Integrals

$\int x^n dx = \frac{x^{n+1}}{n+1} + C \quad (n \neq -1)$ $\int \frac{1}{x} dx = \ln x + C$ $\int e^x dx = e^x + C$	$\int \sin x dx = -\cos x + C$ $\int \cos x dx = \sin x + C$ $\int \tan x dx = \ln \sec x + C$ $\int \sec x dx = \ln \sec x + \tan x + C$	$\int \frac{1}{\sqrt{a^2 - u^2}} du = \sin^{-1} \frac{u}{a} + C$ $\int \frac{1}{a^2 + u^2} du = \frac{1}{a} \tan^{-1} \frac{u}{a} + C$ $\int \frac{1}{u\sqrt{u^2 - a^2}} du = \frac{1}{a} \sec^{-1} \left \frac{u}{a} \right + C$
$\csc^{-1} x = \sin^{-1} \frac{1}{x}$	$\cot^{-1} x = \tan^{-1} \frac{1}{x}$	$\sec^{-1} x = \cos^{-1} \frac{1}{x}$

Miscellaneous

$\lim_{x \rightarrow \infty} \tan^{-1} x = \frac{\pi}{2}$	$\lim_{x \rightarrow -\infty} \tan^{-1} x = -\frac{\pi}{2}$	$\left[\int_a^{u(x)} f(t) dt \right]' = f[u(x)] u'(x)$
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