Calculus Fact Sheet

Essential Derivative Rules

$\frac{d}{dx}(x^n) = nx^{n-1}$	$\frac{d}{dx}(\ln(x)) = \frac{1}{x}$	
$\frac{d}{dx}(e^x) = e^x$	$\frac{d}{dx}(b^x) = b^x \ln(b)$	
$\frac{d}{dx}(\sin(x)) = \cos(x)$	$\frac{d}{dx}(\tan(x)) = \sec^2(x)$	$\frac{d}{dx}(\sec(x)) = \sec(x)\tan(x)$
$\frac{d}{dx}(\cos(x)) = -\sin(x)$	$\frac{d}{dx}(\cot(x)) = -\csc^2(x)$	$\frac{d}{dx}(\csc(x)) = -\csc(x)\cot(x)$
$\frac{d}{dx}\left(\tan^{-1}(x)\right) = \frac{1}{x^2+1}$	$\frac{d}{dx}\left(\sin^{-1}(x)\right) = \frac{1}{\sqrt{1-x^2}}$	$\frac{d}{dx}\left(\sec^{-1}(x)\right) = \frac{1}{x\sqrt{x^2-1}}$
$(FS)' = FS' + F'S$	$\left(\frac{N}{D}\right)' = \frac{DN' - ND'}{D^2}$	$[f(g(x))]' = f'(g(x))g'(x)$

Essential Integral Rules

$\int x^n \, dx = \frac{1}{n+1}x^{n+1} + C$	$\int \frac{1}{ax+b} \, dx = \frac{1}{a}\ln\lvert ax+b\rvert + C$
$\int e^{ax} \, dx = \frac{1}{a}e^{ax} + C$	$\int b^x \, dx = \frac{1}{\ln(b)}b^x + C$
$\int \cos(ax) \, dx = \frac{1}{a}\sin(ax) + C$	$\int \sin(ax) \, dx = -\frac{1}{a}\cos(ax) + C$
$\int \sec^2(x) \, dx = \tan(x) + C$	$\int \csc^2(x) \, dx = -\cot(x) + C$
$\int \sec(x)\tan(x) \, dx = \sec(x) + C$	$\int \csc(x)\cot(x) \, dx = -\csc(x) + C$
$\int \frac{1}{x^2+a^2} \, dx = \frac{1}{a}\tan^{-1}\left(\frac{x}{a}\right) + C$	$\int \frac{1}{\sqrt{a^2-x^2}} \, dx = \sin^{-1}\left(\frac{x}{a}\right) + C$
$\int \tan(x) \, dx = \ln\lvert\sec(x)\rvert + C$	$\int \cot(x) \, dx = \ln\lvert\sin(x)\rvert + C$
$\int \sec(x) \, dx = \ln\lvert\sec(x)+\tan(x)\rvert + C$	$\int \csc(x) \, dx = \ln\lvert\csc(x)-\cot(x)\rvert + C$

$$\int \sec^3(x) \, dx = \frac{1}{2}\sec(x)\tan(x) + \frac{1}{2}\ln\lvert\sec(x)+\tan(x)\rvert + C$$

Precalculus Facts

x	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
$\sin(x)$	0	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
$\cos(x)$	1	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$	0

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

$\ln(1) = 0$	$\ln(e) = 1$	$\ln(a^b) = b\ln(a)$	$\ln(ab) = \ln(a) + \ln(b)$
$x^a x^b = x^{a+b}$	$(x^a)^b = x^{ab}$	$\sqrt[n]{x} = x^{1/n}$	$\frac{1}{x^a} = x^{-1}$