Math 1C **Formula Sheet**

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Maclaurin Series	
$\dfrac{1}{1-x} = \sum_{n=0}^{\infty} x^n,\ R = 1$	$\sin(x) = \sum_{n=0}^{\infty} (-1)^n \dfrac{x^{2n+1}}{(2n+1)!},\ R = \infty$
$e^x = \sum_{n=0}^{\infty} \dfrac{x^n}{n!},\ R = \infty$	$\cos(x) = \sum_{n=0}^{\infty} (-1)^n \dfrac{x^{2n}}{(2n)!},\ R = \infty$
$\ln(1+x) = \sum_{n=1}^{\infty} (-1)^{n-1} \dfrac{x^n}{n},\ R = 1$	$\arctan(x) = \sum_{n=0}^{\infty} (-1)^n \dfrac{x^{2n+1}}{2n+1},\ R = 1$

Taylor's Inequality
If $\lvert f^{(n+1)}(x)\rvert \leq M$ for $\lvert x-a\rvert \leq d$, then the remainder $R_n(x)$ of the Taylor series for $f(x)$ centered at $x = a$ satisfies the inequality $\lvert R_n(x)\rvert \leq \dfrac{M}{(n+1)!}\lvert x-a\rvert^{n+1}$ for $\lvert x-a\rvert \leq d$.

Useful trig identities		
$\sin(2\theta) = 2\sin\theta\cos\theta$	$\cos(2\theta) = \cos^2\theta - \sin^2\theta$	$\cos^2\theta = \dfrac{1+\cos(2\theta)}{2}$
$\tan(2\theta) = \dfrac{2\tan\theta}{1-\tan^2\theta}$	$= 2\cos^2\theta - 1$	$\sin^2\theta = \dfrac{1-\cos(2\theta)}{2}$
$\frac{d}{dx}(\arctan x) = \dfrac{1}{1+x^2}$	$= 1 - 2\sin^2\theta$	