

Taylor Series		
$1/1-x$	$1+x+x^2+x^3+\dots$	$\sum x^n$
$\sin(x)$	$x^1-x^3/3!+x^5/5!-\dots$	$\sum (-1)^n x^{2n+1}/(2n+1)!$
e^x	$1+x+x^2/2!+x^3/3!+\dots$	$\sum x^n/n!$
$\cos(x)$	$1-x^2/2!+x^4/4!-\dots$	$\sum (-1)^n x^{2n}/(2n)!$
centered around 0 ($1/1-x$ only valid for $-1 < x < 1$.)		

Trig Sub's	
$\sqrt{x^2+a^2}$	$x = a \tan(\theta)$
$\sqrt{a^2-x^2}$	$x = a \sin(\theta)$
$\sqrt{x^2-a^2}$	$x = a \sec(\theta)$
$b-ax^2$	$x = \sqrt{b/a} \sin(\theta)$
ax^2+b	$x = \sqrt{b/a} \tan(\theta)$
ax^2-b	$x = \sqrt{b/a} \sec(\theta)$

Convergence Divergence test		
N^{th} term test for divergence	$\lim_{n \rightarrow \infty} a_n \neq 0$	$\sum a_n$ diverges
P-Test	converge $p > 1$	diverge $p \leq 1$
Limit Comparison	$L = \lim_{n \rightarrow \infty} (a_n/b_n)$	$L \neq 0$ series both diverge converge
Ratio test	$r = \lim_{n \rightarrow \infty} a_{n+1}/a_n $	$r < 1$ converge $r > 1$ diverge
Alternating series test	$\lim_{n \rightarrow \infty} a_n = 0$	$\sum (-1)^n a_n$ converges

Common Integrals	
$\int \sin(x) dx$	$-\cos(x) + C$
$\int \cos(x) dx$	$\sin(x) + C$
$\int \tan(x) dx$	$-\ln \cos(x) + C$
$\int \sec(x) dx$	$\ln \sec(x) + \tan(x) + C$
$\int \csc(x) dx$	$-\ln \csc(x) + \cot(x) + C$
$\int \cot(x) dx$	$\ln \sin(x) + C$
$\int \sec^2(x) dx$	$\tan(x) + C$
$\int e^{f(x)} dx$	$e^{f(x)}/f'(x) + C$
$\int (1/x) dx$	$\ln x + C$
$\int (1/x^n) dx$	$(x^{n+1}/(n+1)) + C$
$\int dx/\sqrt{a-x^2}$	$\arcsin(x/\sqrt{a}) + C$
$\int dx/x^2+a$	$(1/\sqrt{a}) \arctan(x/\sqrt{a}) + C$

Important Derivatives	
$d/dx \arctan f(x)$	$f'(x)/x^2+1$
$d/dx \sec(\theta)$	$\sec(\theta)\tan(\theta)$

Power Series	
general form	$\sum a_n(x-a)^n$
an = sequence of coeff.	
center	$x=a$
radius of convergence	$R = \lim_{n \rightarrow \infty} a_n/a_{n+1} $
endpoints	$x=a+R$ and $x=a-R$ in series

Parametric Curves	
Horizontal Tangents (x)	when $dy/dx=0$ t=?

Equations for Parabola	
$y=a(x-h)^2+k$	
Directrix	$y=k-(1/4a)$
Focus	$(h,k+1/4a)$
$x=a(y-k)^2+h$	
Directrix	$x=h-(1/4a)$
Focus	$(h+1/4a,k)$

Equations for Ellipses	
$(x-h)^2/a^2 + (y-k)^2/b^2 = 1$	$c = \sqrt{ a^2-b^2 }$
eccentricity	$c/(\max a b)$
foci (on major axis)	when $x = \text{center}$ and $y = \text{center}$
$y = \text{horizontal axis}$ $x = \text{vertical axis}$	

Trig Identities	
$\sec^2(\theta)$	$\tan^2(\theta)+1$
$\sin^2(\theta)$	$1-\cos^2(\theta)$
$\tan^2(\theta)$	$\sec^2(\theta)-1$
$\cos^2(\theta)$	$[1+\cos(2\theta)]/2$
$\sin^2(\theta)$	$[1-\cos(2\theta)]/2$
double angle $\cos^2(\theta)$	$(1+\cos(2\theta))/2$
double angle $\sin^2(\theta)$	$(1-\cos(2\theta))/2$

Polar Coordinates & Area	
Area	$\int 1/2 (f(x))^2 dx$
One petal of $r = \sin(n\theta)$	interval $[0, \pi/n]$
One petal of $r = \cos(n\theta)$	$[-\pi/2n, \pi/2n]$
Polar > Cartesian	$x = r \cos(\theta)$ $y = r \sin(\theta)$
Cartesian > Polar	$\tan(\theta) = y/x$ $x^2 + y^2 = r^2$

