Calculus 2 Cheat Sheet

by ejj1999 via cheatography.com/66363/cs/16562/

Taylor Series

1/1-x	$1+x+x^2+x^3+\ldots$	$\sum x^n$
sin(x)	$x^1-x^3/3!+x^5/5!-+\ldots$	$\sum (-1)^n x^{2n+1}/(2n+1)!$
e^x	$1+x+x^2/2!+x^3/3!+\ldots$	$\sum x^n/n!$
cos(x)	$1-x^2/2!+x^4/4!-+\ldots$	$\sum (-1)^n x^{2n}/(2n)!$

centered around 0
(1/1-x only valid for -1<x<1.)

Trig Sub's

$\sqrt{}(x^2+a^2)$	x=atan(θ)
$\sqrt{}(a^2-x^2)$	x-asin(θ)
$\sqrt{}(x^2-a^2)$	x=asec(θ)
$b-ax^2$	x= √b / √a sin(θ)
ax^2+b	x= √b / √a tan(θ)
ax^2-b	x= √b / √a sec(θ)

Convergence|Divergence test

N^{th} term test for divergence	lim(n>∞) an	≠0 ∑an diverges
P-Test	converge p>1	diverge p≤1
Limit Comparison	L= lim(n>∞) (an/bn)	L≠0 series both diverge|converge
Ratio test	r= lim(n>∞) |an+1/an|	r<1 converge r>1 diverge
Alternating series test	lim(n>∞) an	=0 $\sum (-1)^n$an converges

Common Integrals

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

Important Derivatives

d/dx arctan f(x)	$f'(x)/x^2+1$
d/dx sec(θ)	sec(θ)tan(θ)

Power Series

general form	$\sum an(x-a)^n$
an = sequence of coeff.	
center	x=a
radius of convergence	R=lim(n>∞) |an/an+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= center and y= center

y= horizontal axis
x= vertical axis

Trig Identities

$sec^2(θ)$	$tan^2(θ)+1$
$sin^2(θ)$	$1-cos^2(θ)$
$tan^2(θ)$	$sec^2(θ)-1$
$cos^2(θ)$	[1+cos(2θ)]/2
$sin^2(θ)$	[1-cos(2θ)]/2
double angle $cos^2(θ)$	(1+cos(2θ)/2
double angle $sin^2(θ)$	(1-cos(2θ)/2

Polar Coordinates & Area

Area	$\int 1/2\ (f(x))^2\ dx$
One petal of r=sin(nθ)	interval [0,π/n]
One petal of r=cos(nθ)	[-π/2n,π/2n]
Polar > Cartesian	x=rcos(θ) y=rsin(θ)
Cartesian > Polar	tan(θ)=y/x $x^2+y^2=r^2$