Cheatography

# Calculus 2 Cheat Sheet

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

## Taylor Series

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

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\|c-onverge |
| 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 conver-gence | 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<br>x= 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(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 | $\tan(\theta)=y/x$ $x^2+y^2=r^2$ |

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