SCOMPOSIZIONI

$a^3 \pm b^3 = (a \pm b)\cdot(a^2 \mp ab + b^2)$

RADICI

$\sqrt{x^2} \neq x \Rightarrow \sqrt{x^2} = |x|$

GONIOMETRIA

$sen(\alpha \pm \beta) = sen(\alpha)\cdot\cos(\beta) \pm sen(\beta)\cdot\cos(\alpha)$

$\cos(\alpha \pm \beta) = \cos(\alpha)\cdot\cos(\beta) \mp sen(\alpha)\cdot sen(\beta)$

LIMITI

$\lim_{x\to 0}\left(\frac{e^x-1}{x}\right)=1$	$\lim_{x\to 0}\left(\frac{\ln(x+1)}{x}\right)=1$
$\lim_{x\to 0}\left(\frac{\sqrt[\alpha]{1+x}-1}{x}\right)=\frac{1}{\alpha}$	$\lim_{x\to 0}\left(\frac{x+1}{x}\right)^x=e$
$\lim_{x\to 0}\left(\frac{sen(x)}{x}\right)=\lim_{x\to 0}\left(\frac{tg(x)}{x}\right)=1$	$\lim_{x\to 0}\left(\frac{arcsen(x)}{x}\right)=\lim_{x\to 0}\left(\frac{arctg(x)}{x}\right)=1$
$\lim_{x\to 0}\left(\frac{1-\cos(x)}{x}\right)=0$	$\lim_{x\to 0}\left(\frac{1-\cos(x)}{x^2}\right)=\frac{1}{2}$

De L'Hopital

Forma $[0\cdot\pm\infty]$, capovolgo una delle due funzioni e uso De L'Hopital

DERIVATE

$D(k)=0$	$D(x^n)=n\cdot x^{n-1}$	$D(e^x)=e^x$ $D(\ln(x))=\frac{1}{x}$
$D(sen\ x)=cosx$ $D(cos\ x)=-senx$	$D(tg(x))=\begin{cases}\frac{1}{\cos^2(x)}\\ 1+tg^2(x)\end{cases}$	$D(cotg(x))=\begin{cases}-\frac{1}{sen^2(x)}\\ -1-cotg^2(x)\end{cases}$
$D(arcsen\ x)=\frac{1}{\sqrt{1-x^2}}$ $D(arccos\ x)=-\frac{1}{\sqrt{1-x^2}}$	$D(arctg\ x)=\frac{1}{1+x^2}$ $D(arccotg\ x)=-\frac{1}{1+x^2}$	

$D(f^g)=D\left(e^{\ln(f^g)}\right)=D\left(e^{g\cdot\ln(f)}\right)$

INTEGRALI

$\int kdx = x$	
$\int x^n dx = \frac{x^{n+1}}{n+1}$	$\int f^n\cdot f'dx=\frac{f^{n+1}}{n+1}$
$\int \frac{1}{x}dx=\ln(\ \|x\|\ )$	$\int \frac{f'}{f}dx=\ln(\ \|f\|\ )$
$\int e^x dx$	$e^f\cdot f'dx=e^f$
$\int senx\ dx=-cosx$	$\int sen(f)\cdot f'\ dx=-\cos(f)$
$\int cosx\ dx=senx$	$\cos(f)\cdot f'dx=sen(f)$
$\int \frac{1}{\cos^2 x}dx=tgx$	$\int \frac{f'}{\cos^2(f)}dx=tg(f)$
$\int \frac{1}{sen^2 x}dx=-cotgx$	$\int \frac{f'}{sen^2(f)}dx=-cotg(f)$
$\int \frac{1}{\sqrt{1-x^2}}dx=arcsenx$	$\int \frac{f'}{\sqrt{1-f^2}}dx=arcsen(f)$
$\int \frac{1}{1+x^2}dx=arctgx$	$\int \frac{f'}{1+f^2}dx=arctg(f)$

$\int \frac{x^{n-1}+\cdots}{x^n+\cdots}dx \rightarrow$ Mi riconduco a $\int \frac{f'}{f}dx$

$\int \frac{x+\cdots}{x^2+\cdots}dx \rightarrow$ Mi riconduco a $\int \frac{f'}{f}dx$ oppure $\int \frac{f'}{1+f^2}dx$

$\int \frac{1}{ax^2+bx+c}dx=\frac{2}{\sqrt{-\Delta}}\cdot arctg\left(\frac{2ax+b}{\sqrt{-\Delta}}\right)+c$

$\int \frac{x^n+\cdots}{x^{m\leq n}+\cdots} \rightarrow$ Divisione $\rightarrow$ Fratti semplici

SERIE

Serie definite: geometriche; telescopiche; armoniche, potenze

Criteri serie positive: rapporto, confronto, asintotico, infinitesimi, integrale

Criteri serie segno alterno: assoluta convergenza, leibniz

Serie potenze: $\sum b_n(x-x_0)^n$, converge per $x\in(x_0\pm r), r=\frac{1}{\lim\left(\frac{b_{n+1}}{b_n}\right)}$

Infinitesimi: se $\lim(n\cdot a_n)<\infty$, allora studio $\lim(n^p\cdot a_n)$, con $p=\frac{3}{2},\frac{5}{4},\frac{9}{8},\ldots$

Resto geometrica $\leq \frac{q_{k+1}}{1-q}$

Resto armonica $< \frac{1}{(\alpha-1)\cdot n^{\alpha-1}}$

$|\text{Resto leibniz}| < |b_{n+1}|$

Resto integrale $\leq \int_{n=i}^{+\infty} f(n)dn$