Formulario ammesso per la prova di Matematica del Continuo per Informatica Musicale

Formule di addizione: $\sin(a+b)=\sin a\cos b+\cos a\sin b$; $\cos(a+b)=\cos a\cos b-\sin a\sin b$

Confronto di infiniti: per ogni $\alpha>0$ e per $x\to+\infty$ risulta: $\ln(x)=o(x^\alpha)$, $x^\alpha=o(e^x)$

Derivate elementari (e primitive corrispondenti):

$f(x)$	x^α	$\ln\lvert x\rvert$	e^x	$\sin x$	$\cos x$	$\tan x$	$\arcsin x$	$\arccos x$	$\arctan x$
$f'(x)$	$\alpha x^{\alpha-1}$	$1/x$	e^x	$\cos x$	$-\sin x$	$1+(\tan x)^2=\dfrac{1}{(\cos x)^2}$	$\dfrac{1}{\sqrt{1-x^2}}$	$\dfrac{-1}{\sqrt{1-x^2}}$	$\dfrac{1}{1+x^2}$

Regole di derivazione:	Regole di integrazione:
$D\big(af(x)+bg(x)\big)=af'(x)+bg'(x)$	Scomposizione $\int(af(x)+bg(x))dx=a\int f(x)dx+b\int g(x)dx$
$D\big(f(x)\cdot g(x)\big)=f'(x)\cdot g(x)+f(x)\cdot g'(x)$	Per parti $\int f(x)\cdot g'(x)dx=f(x)\cdot g(x)-\int f'(x)\cdot g(x)dx$
$D\left(\dfrac{f(x)}{g(x)}\right)=\dfrac{f'(x)\cdot g(x)-f(x)\cdot g'(x)}{(g(x))^2}$	
$D\big(f(g(x))\big)=f'(g(x))\cdot g'(x)$, in particolare $D\left(\dfrac{1}{g(x)}\right)=\dfrac{-g'(x)}{(g(x))^2}$	Per sostituzione $\int f'(g(x))\cdot g'(x)\,dx=f(g(x))$ oppure $\int f(x)\,dx=\left(\int f(g(t))\cdot g'(t)\,dt\right)_{t=g^{-1}(x)}$
$D\big(f^{-1}(y)\big)=\dfrac{1}{(f'(x))}$ ove $x=f^{-1}(y)$	

Formule di Mac Laurin con il resto nella forma di Peano (e confronto di infinitesimi): per $x\to0$ risulta

$$e^x=1+x+\tfrac{1}{2}x^2+\tfrac{1}{3!}x^3+\ldots+\tfrac{1}{n!}x^n+o(x^n)$$

$$\ln(1+x)=x-\tfrac{1}{2}x^2+\tfrac{1}{3}x^3+\ldots+(-1)^n\tfrac{1}{n}x^n+o(x^n)$$

$$\sin x=x-\tfrac{1}{3!}x^3+\tfrac{1}{5!}x^5+\ldots+\tfrac{(-1)^k}{(2k+1)!}x^{2k+1}+o(x^{2k+1})$$

$$\arctan x=x-\tfrac{1}{3}x^3+\tfrac{1}{5}x^5+\ldots+\tfrac{(-1)^k}{(2k+1)}x^{2k+1}+o(x^{2k+1})$$

$$\tfrac{1}{2}(e^x-e^{-x})=\sinh x=x+\tfrac{1}{3!}x^3+\tfrac{1}{5!}x^5+\ldots+\tfrac{1}{(2k+1)!}x^{2k+1}+o(x^{2k+1})$$

$$\cos x=1-\tfrac{1}{2}x^2+\tfrac{1}{4!}x^4+\ldots+\tfrac{(-1)^k}{(2k)!}x^{2k}+o(x^{2k})$$

$$\tfrac{1}{2}(e^x+e^{-x})=\cosh x=1+\tfrac{1}{2}x^2+\tfrac{1}{4!}x^4+\ldots+\tfrac{1}{(2k)!}x^{2k}+o(x^{2k})$$

$$\tan x=x+\tfrac{1}{3}x^3+\tfrac{2}{15}x^5+\tfrac{17}{317}x^7+o(x^7)$$

$$\tanh x=x-\tfrac{1}{3}x^3+\tfrac{2}{15}x^5-\tfrac{17}{317}x^7+o(x^7)$$

$$(1+x)^\alpha=1+\alpha x+\tfrac{\alpha(\alpha-1)}{2}x^2+\tfrac{\alpha(\alpha-1)(\alpha-2)}{3!}x^3+\ldots+\tfrac{\alpha(\alpha-1)\cdot\ldots\cdot(\alpha-n+1)}{n!}x^n+o(x^n)$$

In particolare

$$(1+x)^{-1}=1-x+x^2-x^3+\ldots+(-1)^n x^n+o(x^n)$$

$$(1+x)^{1/2}=1+\tfrac{1}{2}x-\tfrac{1}{8}x^2+\tfrac{1}{16}x^3-\tfrac{5}{128}x^4+o(x^4)$$