1) LIMITI NOTEVOLI

$$\lim_{x\to 0}\frac{\sin x}{x}=1,\quad \sin x = x+o(x)\ ,\ \text{per } x\to 0 \tag{1}$$

$$\lim_{x\to 0}\frac{1-\cos x}{x^2}=\frac{1}{2},\quad \cos x = 1-\frac{1}{2}x^2+o(x^2)\ ,\ \text{per } x\to 0 \tag{2}$$

$$\lim_{x\to 0}\frac{e^x-1}{x}=1,\quad e^x = 1+x+o(x)\ ,\ \text{per } x\to 0 \tag{3}$$

$$\lim_{x\to 0}\frac{\log(x+1)}{x}=1,\quad \log(x+1) = x+o(x)\ ,\ \text{per } x\to 0 \tag{4}$$

$$\lim_{x\to 0}\frac{(x+1)^\alpha-1}{x}=\alpha,\quad ,\quad (x+1)^\alpha = 1+\alpha x+o(x)\ ,\ \text{per } x\to 0 \tag{5}$$

$$\lim_{x\to +\infty}\left(1+\frac{1}{x}\right)^x=e \tag{6}$$

$$\lim_{x\to -\infty}\left(1+\frac{1}{x}\right)^x=e \tag{7}$$

$$\lim_{x\to +\infty}\frac{a^x}{x^\alpha}=+\infty \quad (\text{se } a>1) \tag{8}$$

$$\lim_{x\to +\infty}\frac{\log x}{x^\alpha}=0 \quad (\text{se } \alpha>0) \tag{9}$$

$$\lim_{x\to 0^+} x^\alpha \log x=0 \quad (\text{se } \alpha>0) \tag{10}$$

$$\lim_{n\to \infty}\frac{a^n}{n!}=0 \tag{11}$$

$$\lim_{n\to \infty}\frac{n!}{n^n}=0 \tag{12}$$

$$\lim_{n\to \infty}\sqrt[n]{n!}=+\infty \tag{13}$$

2) DERIVATE

2a) REGOLE DI DERIVAZIONE

$$(f+g)'=f'+g', \tag{14}$$

$$(\alpha f)'=\alpha f'\ ,\quad (\text{se } \alpha\in\mathbb{R}) \tag{15}$$

$$(fg)'=f'g+fg' \tag{16}$$

$$\left(\frac{f}{g}\right)' = \frac{f'g - fg'}{g^2} \tag{17}$$

$$Df(g(x)) = f'(g(x))\,g'(x) \tag{18}$$

$$Df^{-1}(y_0) = \frac{1}{f'(x_0)}, \quad \text{con } y_0 = f(x_0),\ f'(x_0) \neq 0,\ (f^{-1} \text{ è la funzione inversa di } f) \tag{19}$$

2b)) TABELLA DELLE DERIVATE

f	f'
1	0
x^α $(\alpha \in \mathbb{R})$	$\alpha x^{\alpha-1}$
a^x	$a^x \log a$
$\sin x$	$\cos x$
$\cos x$	$-\sin x$
$\tan x$	$1 + \tan^2 x,\ \frac{1}{\cos^2 x}$
$\log \lvert x \rvert$	$\frac{1}{x}$
$\arcsin x$	$\frac{1}{\sqrt{1-x^2}}$
$\arccos x$	$-\frac{1}{\sqrt{1-x^2}}$
$\arctan x$	$\frac{1}{1+x^2}$