FORMULARIO PER LA MATURITÀ

Numeri complessi

$z = x + i \cdot y = |z|(\cos\varphi + i \cdot \sin\varphi)$ $\quad z_1 \cdot z_2 = |z_1||z_2|(\cos(\varphi_1+\varphi_2) + i \cdot \sin(\varphi_1+\varphi_2))$ $\quad z^n = |z|^n(\cos n\varphi + i \cdot \sin n\varphi)$

$|z| = \sqrt{x^2 + y^2}$ $\quad \varphi = \arccos\frac{x}{|z|}$ se $y > 0$, $\varphi = -\arccos\frac{x}{|z|}$ se $y < 0$ $\quad \frac{z_1}{z_2} = \frac{|z_1|}{|z_2|}(\cos(\varphi_1-\varphi_2) + i \cdot \sin(\varphi_1-\varphi_2))$

$z^n - z_0 = 0$ ha n soluzioni $z_{k+1} = \sqrt[n]{|z_0|}\left(\cos\frac{\varphi+2k\pi}{n} + i \cdot \sin\frac{\varphi+2k\pi}{n}\right)$, $k = 0, 1, \dots, n-1$

Successioni e serie

aritmetiche $s_n = \sum_{k=1}^{n} a_k = \frac{n(a_1+a_n)}{2}$ $\qquad$ geometriche $s_n = \sum_{k=1}^{n} a_k = a_1\frac{q^n-1}{q-1}$

Goniometria e trigonometria

$\sin 2x = 2\sin x\cos x$ $\quad \cos 2x = \cos^2 x - \sin^2 x$ $\quad \cos^2 x = \frac{\cos 2x+1}{2}$ $\quad \sin^2 x = \frac{1-\cos 2x}{2}$ $\quad \frac{\sin\alpha}{a} = \frac{\sin\beta}{b} = \frac{\sin\gamma}{c}$

$\sin(x+y) = \sin x\cos y + \sin y\cos x$ $\quad \cos(x+y) = \cos x\cos y - \sin x\sin y$ $\quad a^2 = b^2 + c^2 - 2bc\cos\alpha$

$A = \frac{ab\sin\gamma}{2} = \frac{bc\sin\alpha}{2} = \frac{ac\sin\beta}{2} = \sqrt{\frac{(a+b+c)(a+b-c)(a-b+c)(-a+b+c)}{16}}$ $\quad b^2 = c^2 + a^2 - 2ac\cos\beta$ $\quad c^2 = a^2 + b^2 - 2ab\cos\gamma$

Calcolo combinatorio e probabilità

$\binom{n}{k} = \frac{n!}{k!(n-k)!}$ $\quad p(E) = \frac{casi\ favorevoli}{casi\ ugualmente\ possibili}$ $\quad p(A/B) = \frac{P(A\cap B)}{P(B)}$

$(a+b)^n = \binom{n}{0}a^n b^0 + \binom{n}{1}a^{n-1}b^1 + \binom{n}{2}a^{n-2}b^2 + \dots + \binom{n}{n-1}a^1 b^{n-1} + \binom{n}{n}a^0 b^n$

Statistica

$\bar{x} = \frac{\sum_{i=1}^{n} x_i f_i}{n}$ $\quad \sigma = \sqrt{\frac{\sum_{i=1}^{n}(x_i-\bar{x})^2 \cdot f_i}{n}} = \sqrt{\left(\overline{x^2} - \bar{x}^2\right)}$

Geometria analitica

$|AB| = \sqrt{(x_B - x_A)^2 + (y_B - y_A)^2}$ $\quad |P, retta| = \frac{|a\cdot x_0 + b\cdot y_0 + c|}{\sqrt{a^2+b^2}}$ $\quad \vec{u}\cdot\vec{v} = u_x \cdot v_x + u_y \cdot v_y$ $\quad \cos\varphi = \frac{\vec{u}\cdot\vec{v}}{|u|\cdot|v|}$

Coniche

Ellisse: $c^2 = |a^2 - b^2|$ $\quad$ Iperbole: $c^2 = a^2 + b^2$ $\quad$ asintoti $y = \pm\frac{b}{a}x$

Circonferenza $x^2 + y^2 + \alpha x + \beta y + \gamma = 0$ oppure $(x - x_c)^2 + (y - y_c)^2 = r^2$

Calcolo differenziale

$\lim_{x\to 0}\left(1 + \frac{1}{x}\right)^x = e$ $\quad$ se $\lim_{x\to a}\frac{f}{g} = \frac{0}{0}\ opp. \frac{\infty}{\infty} \Rightarrow \lim_{x\to a}\frac{f}{g} \overset{H}{=} \lim_{x\to a}\frac{f'}{g'}$ $\quad (f+g)' = f' + g'$ $\quad (f-g)' = f' - g'$

$(k \cdot f)' = k \cdot f'$ $\quad (f \cdot g)' = f' \cdot g + f \cdot g'$ $\quad \left(\frac{f}{g}\right)' = \frac{f'\cdot g - f\cdot g'}{g^2}$ $\quad (g^n)' = n \cdot g' \cdot g^{n-1}$

Funzioni

Dominio: $y = \sqrt{g(x)}$ $g(x) \geq 0$; $\quad y = \ln g$ $g > 0$; $\quad y = \frac{h}{g}$ $g \neq 0$

pari $f(-x) = f(x)$ $\quad$ dispari $f(-x) = -f(x)$ $\quad$ periodica $f(x + kp) = f(x)$ k intero

Calcolo integrale

$\int f(x)\,dx = F(x) + c$ $\quad \int_a^b f\,dx = F(b) - F(a)$ $\quad \int(f \pm g)\,dx = \int f\,dx \pm \int g\,dx$ $\quad \int k \cdot f\,dx = k\int f\,dx$ con $k \neq 0$

$\int 0\,dx = c$ $\quad \int dx = x + c$ $\quad \int e^x\,dx = e^x + c$ $\quad \int\frac{1}{x+k}dx = \ln|x+k| + c$ $\quad \int\cos x\,dx = \sin x + c$

$\int\sin x\,dx = -\cos x + c$ $\quad \int\frac{1}{x^2+1}dx = \arctan x + c$ $\quad \int x^n\,dx = \frac{1}{n+1}x^{n+1} + c$ $(n \neq -1)$

$\int\frac{1}{ax^2+bx+c}\,dx = \frac{2}{\sqrt{-\Delta}}\arctan\left(\frac{2ax+b}{\sqrt{-\Delta}}\right) + c$ se $\Delta < 0$ $\quad$ Integrazione per parti $\int f' \cdot g\ dx = f \cdot g - \int f \cdot g'\ dx$

Integrazione per sostituzione: $g(x) = t$ e $g'(x)dx = dt$

Area tra due funzioni: $A = \left|\int_a^b f_1(x)\,dx - \int_a^b f_2(x)\,dx\right|$ $\quad$ volume $V = \pi\int_a^b f^2(x)\,dx$