INTEGRALI

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ex $f(x) \mid f(0)=1 \; ; \; f'(1)=4 \; ; \; f''(x)=12x+2$

mi aspetto una cubica

$$f'(x)=\int 12x+2\,dx = 6x^2+2x+K$$

$$f'(1)=4 \Rightarrow 6\cdot 1^2+2\cdot 1+K=4 \Rightarrow K=-4$$

$$f'(x)=6x^2+2x-4$$

$$f(x)=\int 6x^2+2x-4\,dx = 2x^3+x^2-4x+K$$

$$f(0)=1 \Rightarrow K=1 \qquad f(x)=2x^3+x^2-4x+1$$

$\square$

ex

$f''(x) = \frac{1}{x^2}$; $f'(1) = 3$; $f(e) - f(1) = ?$

$$f'(x) = \int \frac{1}{x^2}\, dx = -\frac{1}{x} + K$$

$$f'(1) = 3 \Rightarrow K - 1 = 3 \Rightarrow K = 4$$

$$f(x) = \int \left(-\frac{1}{x} + 4\right) dx = -\ln|x| + 4x + K$$

$$f(e) - f(1) = -\ln e + 4e + \ln 1 - 4 = -1 + 4e + 0 - 4 = 4e - 5 \quad \square$$

METODO DI SOSTITUZIONE

⇝ cambio variabile

$$\int \frac{1}{1+\sqrt{x}}\,dx =$$

SOST: $\sqrt{x} = t$

dt ?? $Dt = D\sqrt{x}$

RICAVO x

$x = t^2 \Rightarrow dx = 2t\,dt$

$$= \int \frac{1}{1+t}\,2t\,dt = 2\int \frac{t}{t+1}\,dt =$$

$$= 2\int \left(1 - \frac{1}{t+1}\right) dt =$$

$$= 2\left[t - \ln|t+1|\right] + K = 2\sqrt{x} - 2\ln(\sqrt{x}+1) + K$$