

Esercizi per le vacanze

Studiare il grafico delle funzioni.

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

$$2) f(x) = \frac{x^2 - 6x}{x+2}$$

$$3) f(x) = \frac{x-2}{x^2 - 2x - 24}$$

$$4) f(x) = \sqrt[3]{4(2x-1)(x-1)^2}$$

Calcolare i limiti:

$$1) \lim_{x \rightarrow 0} \frac{e^{-x^2} - \cos(x^2) \cos(\sqrt{2}x)}{(\sqrt{1+x^3} - 1) \operatorname{tg} x} \quad (5/3)$$

$$2) \lim_{n \rightarrow \infty} \frac{n!}{3^n} \left[\sqrt{(n!)^2 + 3^n} - \sqrt{(n!)^2 + 2^n} \right] \quad (1/2)$$

$$3) \lim_{x \rightarrow 0} \frac{e^{-x^2} - \cos^2 x}{\operatorname{tg}(x^4) \sin(\frac{\pi}{2} + x)} \quad (1/e)$$

$$4) \lim_{n \rightarrow \infty} \lg(n!) \left[\sqrt{n^6 + n} - \sqrt{n^6 + 1} \right] \quad (0)$$

$$5) \lim_{x \rightarrow 0} \frac{\lg(1+x \sin x) + 1 - e^{x^2}}{\sqrt{1+2x^4} - 1} \quad (-5/e)$$

$$6) \lim_{x \rightarrow 0} \frac{5^{1-\sin^2 x} - 5^{\cos(\sqrt{2}x)}}{(1-\cos x)^2} \quad \left(\frac{10}{3} \lg 5\right)$$

calcolare gli integrali.

$$1) \int \frac{\cos^2 x + \sin x \cos x}{-\cos^2 x + \sin x \cos x} dx \quad (\lg |\sin x - \cos x| + C)$$

$$2) \int \frac{x+2}{x \sqrt[3]{x+1}} dx \quad \left(\begin{aligned} &t = \sqrt[3]{x+1} \\ &\frac{3}{2}t^2 + 2 \lg |t-1| - \frac{1}{4}(t^2+t+1) \\ &+ 2\sqrt{3} \operatorname{arctg}\left(\frac{2t+1}{\sqrt{3}}\right) + C \end{aligned} \right)$$

$$3) \int \frac{dx}{4-8\cos^2 x} dx \quad \left(\frac{1}{3} \operatorname{arctg}(3 \operatorname{tg} x) + C \right)$$

$$4) \int \frac{dx}{\sqrt{x^2-1} - x} \quad \left(\begin{aligned} &t = \sqrt{x^2-1} - x \\ &-\frac{1}{2} \lg |t| - \frac{1}{4} \frac{1}{2x^2-1-2x\sqrt{x^2-1}} + C \end{aligned} \right)$$

$$5) \int \frac{dx}{\sin x (2 + \cos x - 2 \sin x)} \quad \left(\frac{1}{3} \lg | \operatorname{tg} \frac{x}{2} | + \frac{5}{3} \lg | \operatorname{tg} \frac{x}{2} - 3 | - 2 \lg | \operatorname{tg} \frac{x}{2} - 1 | + C \right)$$

$$6) \int \frac{dx}{3x + \sqrt{x^2+5}} \quad \left(-\frac{1}{4} \lg |\sqrt{x^2+5} - x| + \frac{3}{8} \lg |2x^2-5-2x\sqrt{x^2+5}| + C \right)$$

$x^2+5 = (x+t)^2$