

Esercizi.
Integrali generalizzati

Stabilire se i seguenti integrali sono convergenti

$$\begin{array}{ll} a) \int_0^{+\infty} \frac{x^3 - x + 1}{x^4 + 1} dx & [sol : n]; \\ b) \int_0^{+\infty} \frac{x^2 + 1}{x + 1} dx & [sol : n]; \\ c) \int_0^{+\infty} \frac{x^2 + x}{x^4 + 1} dx & [sol : s]; \\ d) \int_1^{+\infty} \frac{\sqrt{x^2 + x}}{\sqrt[3]{x^4 + 1}} dx & [sol : n]; \\ e) \int_{-1}^0 \frac{x^4 + x}{\sqrt{1 - x^2}} dx & [sol : s]; \\ f) \int_0^1 \frac{\sqrt[3]{x}}{\sqrt{x^7 + x^3}} dx & [sol : n]; \\ g) \int_1^2 \frac{\sqrt{x - 1}}{\sqrt{x^3 - 1}} dx & [sol : s]; \\ h) \int_0^{\frac{\pi}{2}} \frac{x}{\sqrt{\cos x}} dx & [sol : s]; \\ i) \int_0^1 \log x dx & [sol : s]; \\ l) \int_0^{+\infty} \frac{\sin x}{x^3 + x + 1} dx & [sol : s]; \\ m) \int_{-\infty}^1 x^2 e^x dx & [sol : s]; \\ n) \int_1^{+\infty} \frac{e^x}{e^{2x} + 3x} dx & [sol : s]; \\ o) \int_0^1 \frac{\sin x}{x} dx & [sol : s]; \\ p) \int_0^1 \frac{1}{\log x} dx & [sol : n]; \end{array}$$

Stabilire per quali valori del parametro $\alpha \geq 0$ sono convergenti i seguenti integrali

$$\begin{array}{ll} a) \int_0^1 \frac{1 - \cos x}{x^\alpha} dx & [sol : \alpha < 3]; \\ b) \int_5^{+\infty} \frac{x^\alpha + x^2 + x}{x^4 + 1} dx & [sol : \alpha < 3]; \\ c) \int_1^{+\infty} \frac{x^2 + \log x}{e^{\alpha x}} dx & [sol : \alpha > 0]; \\ d) \int_{-1}^1 \frac{4}{(x^2 - 1)^\alpha} dx & [sol : \alpha < 1]; \\ e) \int_1^{+\infty} \frac{1}{3x^{3\alpha}(x^2 - 1)^\alpha} dx & [sol : \alpha \in (1/5, 1)]; \\ f) \int_2^{+\infty} \frac{1}{x^\alpha \log x} dx & [sol : \alpha > 1]; \\ g) \int_2^{+\infty} \frac{1}{x(\log x)^\alpha} dx & [sol : \alpha > 1]; \\ h) \int_0^{+\infty} x^\alpha e^{-x} dx & [sol : \alpha \geq 0]; \end{array}$$