

## ESERCIZI SUGLI INTEGRALI GENERALIZZATI

Dire per quali valori del parametro  $\alpha \in \mathbb{R}^+$ , i seguenti integrali convergono.

$$1) \int_0^{+\infty} \frac{\arctan x}{x^2 + x^\alpha} dx,$$

$$2) \int_0^{+\infty} \frac{\sqrt{x}}{x + x^{2\alpha}} \cdot \frac{1}{\log(1+x)} dx,$$

$$3) \int_1^{+\infty} \frac{\sin(x-1)}{x^2(x-1)^\alpha \log x} dx,$$

$$4) \int_{\sqrt{2}}^{+\infty} \frac{\sqrt[4]{x}}{\sqrt{x^2-2}(x-\sqrt{2})^\alpha} dx,$$

$$5) \int_0^{+\infty} \frac{\sin x - x}{x^5 + x^{2\alpha}} dx,$$

$$6) \int_0^{+\infty} \frac{e^{-x} - 1}{(\arctan x)^\alpha \cdot \sqrt{x + x^{3\alpha}}} dx,$$

$$7) \int_1^2 \frac{\sin((x-1)^\alpha)}{(2x^2-2)\sqrt{x-1}} dx,$$

$$8) \int_0^{+\infty} \frac{\arctan(\sqrt{x} + x)}{(1 + \log(1+x))(x + x^\alpha)} dx,$$

$$9) \int_0^{+\infty} \frac{1 - e^{-x}}{x^{2\alpha}(\log(1+x))^{1+\alpha}} dx,$$

$$10) \int_0^{+\infty} \frac{\sqrt{x} + 2x^\alpha}{x^2 + x^{3\alpha}} dx.$$

**SOLUZIONI:** 1)  $0 \leq \alpha < 2$ , 2) per nessun  $\alpha \in \mathbb{R}^+$ , 3)  $0 \leq \alpha < 1$ , 4)  $1/4 < \alpha < 1/2$ , 5)  $0 \leq \alpha < 2$ , 6)  $2/3 < \alpha < 4/3$ , 7)  $\alpha > 1/2$ , 8)  $\alpha > 1$ , 9)  $1/2 \leq \alpha < 2/3$ , 10)  $0 \leq \alpha < 1/2$ .