METODI MATEMATICI della FISICA

INTEGRALI proposti/svolti

$$\int_{-\infty}^{+\infty} \frac{x^2}{x^4+1}\mathrm{d}x \qquad \frac{\pi}{\sqrt{2}} \tag{1}$$

$$\int_{0}^{\infty} \frac{\cos x}{x^2+1}\mathrm{d}x \qquad \frac{\pi}{2e} \tag{2}$$

$$\int_{0}^{\infty} \frac{\log x}{x^2-1}\mathrm{d}x \qquad \frac{\pi^2}{4} \tag{3}$$

$$\int_{0}^{\infty} \frac{x^{m-1}}{x^n+1}\mathrm{d}x \qquad \frac{\pi}{n}\frac{1}{\sin\left(\pi\frac{m}{n}\right)} \tag{4}$$

$$\int_{-\infty}^{+\infty} \frac{1}{(x^2+1)^2}\mathrm{d}x \qquad \frac{\pi}{2} \tag{5}$$

$$\int_{0}^{+\infty} \frac{x\cos\left(\frac{1}{x^2}\right)}{x^4+4}\mathrm{d}x \qquad \frac{\pi}{8\sqrt{e}} \tag{6}$$

$$\int_{-\infty}^{+\infty} \frac{2x^2+x+1}{x^4+5x^2+4}\mathrm{d}x \qquad \frac{5}{6}\pi \tag{7}$$

$$\int_{-\infty}^{+\infty} \frac{1}{(x^2+1)^2}\mathrm{d}x \qquad \frac{\pi}{2} \tag{8}$$

$$\int_{0}^{\infty} \frac{x^a}{x^2+1}\mathrm{d}x \qquad \frac{\pi}{2}\frac{1}{\cos\left(a\frac{\pi}{2}\right)} \tag{9}$$

$$\int_{0}^{\infty} \frac{\log(1+x^2)}{x^2+1}\mathrm{d}x \qquad \pi\log 2 \tag{10}$$

$$\int_{0}^{\infty} \frac{\sqrt{x}}{x^3+1}\mathrm{d}x \qquad \frac{\pi}{3} \tag{11}$$

$$\int_{-\infty}^{\infty} \frac{\sin^2 x}{x^2+a^2}\mathrm{d}x \qquad \frac{\pi}{2a}(1-e^{-2a}) \tag{12}$$

$$\int_{-\infty}^{\infty} \frac{1}{(x^2+4x+5)^2}\mathrm{d}x \qquad \frac{\pi}{2} \tag{13}$$

$$\int_{0}^{\infty} \frac{1}{x^4+x^2+1}\mathrm{d}x \qquad \frac{\pi}{6}\sqrt{3} \tag{14}$$

$$\int_{0}^{2\pi} \frac{\cos(3\theta)}{5-4\cos(\theta)}\mathrm{d}x \qquad \frac{\pi}{12} \tag{15}$$

$$\int_{-\infty}^{+\infty} \frac{e^{2ix}}{x^4+10x^2+9}\mathrm{d}x \qquad \frac{\pi}{8}\left(\frac{1}{e^2}-\frac{1}{3}\frac{1}{e^6}\right) \tag{16}$$

$$\int_{0}^{+\infty} \frac{1}{x^6+1}\mathrm{d}x \qquad \frac{\pi}{3} \tag{17}$$

$$\int_{-\infty}^{+\infty} \frac{x}{(x^2+2x+2)(x^2+4)}\mathrm{d}x \qquad -\frac{\pi}{10} \tag{18}$$

$$\int_{-\infty}^{+\infty} \frac{x^3\sin x}{(x^2+1)^2}\mathrm{d}x \qquad \frac{\pi}{2e} \tag{19}$$

$$\int_{0}^{+\infty} \frac{x^a}{(x+1)^2}\mathrm{d}x \qquad \frac{\pi a}{\sin(\pi a)} \qquad -1<a<1 \tag{20}$$

$$\int_{-\infty}^{\infty} \frac{\sin x}{x}\mathrm{d}x \qquad \pi \tag{21}$$

$$\int_{0}^{\infty} \frac{\cosh ax}{\cosh x}\mathrm{d}x \qquad \frac{\pi}{2\cos\left(a\frac{\pi}{2}\right)} \tag{22}$$

$$\int_{-\infty}^{\infty} \frac{x^2}{(x^2+1)^2(x^2+2x+2)}\mathrm{d}x \qquad \frac{7\pi}{50} \tag{23}$$

$$\int_{0}^{\infty} \frac{1}{x^4+3x^2+2}\mathrm{d}x \qquad \pi\left(\frac{1}{2}-\frac{1}{2\sqrt{2}}\right) \tag{24}$$

$$\int_0^\infty \frac{x}{x^4+3x^2+2}\mathrm{d}x \qquad \frac{1}{2}\log 2 \tag{25}$$

$$\int_{-\infty}^\infty \frac{x\sin\pi x}{x^2+2x+5}\mathrm{d}x \qquad -\pi e^{-2\pi} \tag{26}$$

$$\int_0^\infty \sin\left(x^2\right)\mathrm{d}x \qquad \frac{1}{2}\sqrt{\frac{\pi}{2}} \tag{27}$$

$$\int_0^\infty \frac{x\sin\pi x}{(x^2+1)^2}\mathrm{d}x \qquad e^{-\pi}\pi^2/4 \tag{28}$$

$$\int_0^\infty x^{a-1}\frac{\log x}{x+1}\mathrm{d}x \qquad -\frac{\pi^2\cos(\pi a)}{\sin^2(\pi a)} \tag{29}$$

$$\int_0^\infty \frac{x^{1/4}}{(x+1)^2}\mathrm{d}x \qquad \frac{\sqrt{2}\pi}{4} \tag{30}$$

$$\int_1^2 \frac{1}{x^2+3x+2}\mathrm{d}x \qquad \log\frac{9}{8} \tag{31}$$

$$\mathrm{PV}\int_{-\infty}^{+\infty} \frac{x}{(x-a)(x^2+1)}\mathrm{d}x \qquad \frac{\pi}{1+a^2} \tag{32}$$

$$\mathrm{PV}\int_{-\infty}^{\infty} \frac{1}{(x^2+2)(1+x)}\mathrm{d}x \qquad \frac{\pi}{3\sqrt{2}} \tag{33}$$

$$\mathrm{PV}\int_{-\infty}^{\infty} \frac{e^{ikx}}{x-y}\mathrm{d}x \qquad i\pi e^{iky} \quad (k>0) \tag{34}$$