Esercizi di Analisi Matematica II svolti a lezione da marzo a giugno 2011

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1 Integrali

$$\int_0^1 2x\,dx, \quad \int_0^1 \frac{1}{1+x^2}\,dx, \quad \int_{-\frac{1}{2}}^{\frac{1}{2}} \frac{1}{\sqrt{1-x^2}}\,dx, \quad \int_{\frac{\pi}{3}}^{\frac{\pi}{2}} \cos x\,dx, \quad \int_1^2 x^3\,dx,$$

$$\int_{\frac{\pi}{2}}^{\pi} \sin x\,dx, \quad \int_2^3 e^x\,dx, \quad \int_4^5 \frac{1}{x}\,dx, \quad \int_4^7 1\,dx, \quad \int_5^9 3\,dx, \quad \int_0^1 \frac{2x}{1+x^2}\,dx,$$

$$\int_0^{\frac{\pi}{4}} \operatorname{tg} x\,dx, \quad \int_0^1 \frac{e^x}{1+e^x}\,dx, \quad \int_2^3 (1+x^3)^4 x^2\,dx, \quad \int_0^{\frac{\pi}{2}} (\cos x)^2 \sin x\,dx,$$

$$\int_1^2 \frac{1}{(6x+7)^9}\,dx, \quad \int_1^2 x\ln x\,dx, \quad \int_1^2 \ln x\,dx, \quad \int_0^{\pi} x\sin x\,dx, \quad \int_{-\pi}^{\pi} 1\,dx, \quad \int_{-\pi}^{\pi} 0\,dx;$$

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$$\text{quando } k,m\in\mathbb{N}:\quad \int_{-\pi}^{\pi}\cos(kx)\,dx,\quad \int_{-\pi}^{\pi}\sin(kx)\,dx,\quad \int_{-\pi}^{\pi}[\cos(mx)]^2\,dx,$$

$$\int_{-\pi}^{\pi}[\sin(mx)]^2\,dx,\quad \int_{-\pi}^{\pi}\cos(kx)\cos(mx)\,dx,\quad \int_{-\pi}^{\pi}\sin(kx)\sin(mx)\,dx,$$

$$\int_{-\pi}^{\pi}\cos(kx)\sin(mx)\,dx;$$

$$\int_{3}^{4}e^{x^2}2x\,dx,\quad \int_{\frac{1}{2}}^{\frac{\sqrt{3}}{2}}\sqrt{1-t^2}\,dt,\quad \int_{-1}^{1}x^8\sin x\,dx,\quad \int_{-\pi}^{\pi}x^9\cos x\,dx,$$

$$\int_{-2}^{2}\frac{x^3}{1+x^{10}}\,dx,\quad \int_{-10}^{10}x^5\,\operatorname{arctg}(1+x^2)\,dx,\quad \int_{1}^{+\infty}\frac{1}{x}\,dx,\quad \int_{1}^{+\infty}\frac{1}{x^2}\,dx,\quad \int_{1}^{+\infty}\frac{1}{\sqrt{x}}\,dx,$$

$$\int_{\sqrt{3}}^{+\infty}\frac{1}{1+x^2}\,dx,\quad \int_{2}^{+\infty}e^{-x}\,dx,\quad \int_{-\infty}^{-3}\frac{1}{-x}\,dx,\quad \int_{-\infty}^{-4}\frac{1}{x^2}\,dx,\quad \int_{-\infty}^{-\frac{1}{\sqrt{3}}}\frac{1}{1+x^2}\,dx,$$

$$\int_{-\infty}^{+\infty}e^{-|x|}\,dx,\quad \int_{-\infty}^{+\infty}\frac{1}{1+x^2}\,dx,\quad \int_{-\infty}^{+\infty}\frac{2|x|}{1+x^2}\,dx.$$

2 Serie

$$\sum_{k=1}^{+\infty} \frac{1}{k(k+1)}, \quad \sum_{k=1}^{+\infty} \left(\frac{1}{2}\right)^{k-1}, \quad \sum_{k=1}^{+\infty} (-1)^{k-1}, \quad \sum_{k=1}^{+\infty} (b)^{k-1}, \quad \sum_{k=1}^{+\infty} \frac{1}{k},$$

$$\sum_{k=1}^{+\infty} \left(\frac{1}{k}\right)^{p}, \quad \sum_{k=1}^{+\infty} \sin\frac{1}{k}, \quad \sum_{k=1}^{+\infty} \left(\frac{1}{k+15}\right)^{9}, \quad \sum_{k=1}^{+\infty} \ln\left(1+\frac{1}{\sqrt{k}}\right),$$

$$\sum_{k=1}^{+\infty} \left(e^{\frac{1}{k^3}} - 1\right).$$

3 Derivate

$$\mathcal{I}'(t) = ... \quad \text{dove}$$

$$\mathcal{I}(t) = \int_2^t x^3\,dx, \quad \mathcal{I}(t) = \int_1^t e^{x^2}\,dx, \quad \mathcal{I}(t) = \int_1^t \sin(1+x^4)\,dx,$$

$$\mathcal{I}(t) = \int_2^t \operatorname{arctg}(1+e^x+x^2)\,dx, \quad \mathcal{I}(t) = \int_3^t \frac{1+e^x+\sin x}{1+x^2+x^4}\,dx,$$

$$\mathcal{I}(t) = \int_4^t \frac{1+\ln(1+x^2)+\cos x}{10+\sin x+x^2}\,dx;$$

$$\mathcal{G}'(t) = ... \quad \text{dove}$$

$$\mathcal{G}(t) = \int_t^2 x^3\,dx, \quad \mathcal{G}(t) = \int_t^5 \frac{\cos(1+x^2)}{15+\sin x}\,dx, \quad \mathcal{G}(t) = \int_t^6 \frac{e^{-x}+e^x}{1+x^2}\,dx,$$

$$\mathcal{G}(t) = \int_t^7 \cos(1+x^2+e^x)\,dx;$$

$$\frac{\partial u}{\partial x}(x,y) = ... \qquad \frac{\partial u}{\partial y}(x,y) = ... \qquad \text{dove}$$

$$u(x,y) = 9x^5y^6, \quad u(x,y) = \sin(3x^2+7y), \quad u(x,y) = \ln(5x^2+6y^4),$$

$$u(x,y) = 6x^3+7y^2, \quad u(x,y) = e^{x^2+y^4}, \quad u(x,y) = \mathrm{arctg}(2x+3y),$$

$$u(x,y) = (\sin x)(\cos y), \quad u(x,y) = \sqrt{3x^2+5y^4}, \quad u(x,y) = \cos(2xy).$$

4 Successioni definite per ricorrenza

$$x_{n+1} = ax_n \quad \text{dove } a > 0;$$

$$x_{n+1} = (1+\alpha)x_n - \beta(x_n)^2 \quad \text{dove } 0 < \alpha < 1, \quad 0 < \beta;$$

$$\begin{cases} x_1 & = 5, \\ x_{k+1} & = \frac{1}{2}x_k + 10; \end{cases}$$

$$\begin{cases} x_1 & = 80, \\ x_{k+1} & = \frac{1}{4}x_k + 30. \end{cases}$$

5 Formula di Taylor

$$\lim_{x \to 0} \frac{\sin x - x}{x^2 \sin x};$$

$$\text{approssimare } \sin\left(\frac{1}{10}\right) \text{ con un errore inferiore a } 10^{-7}.$$