A. Spočítejte integrály:

1. $\int_{-\infty}^{+\infty} \frac{x\,dx}{(x^2+4x+13)^2}$
2. $\int_{0}^{+\infty} \frac{x^2+1}{x^4+1}\,dx$
3. $\int_{-\infty}^{+\infty} \frac{dx}{(x^2+a^2)(x^2+b^2)}$
4. $*\int_{-\infty}^{+\infty} \frac{dx}{(x^2+1)^n}$
5. $\int_{-\infty}^{\infty} \frac{x^2\,dx}{(x^2+1)(x^2+9)}$
6. $\int_{-\infty}^{\infty} \frac{x^2-x+2}{x^4+10x^2+9}\,dx$
7. $\int_{-\infty}^{\infty} \frac{dx}{x^2-2ix-2}$
8. $\int_{-\infty}^{\infty} \frac{dx}{(x^2+1)^3}$
9. $\int_{-\infty}^{\infty} \frac{x^2\,dx}{x^4+6x^2+25}$
10. $\int_{0}^{\infty} \frac{x^6\,dx}{(x^4+a^4)^2}$
11. $\int_{0}^{\infty} \frac{x^4\,dx}{(a+bx^2)^4}$
12. $\int_{-\infty}^{\infty} \frac{dx}{(x^2+a^2)(x^2+b^2)^2}$
13. $\int_{0}^{\infty} \frac{x^4+1}{x^6+1}\,dx$
14. $\int_{-\infty}^{\infty} \frac{x^2\,dx}{(x^2+4ix-5)^2}$

B. Spočítejte integrály:

1. $\int_{0}^{+\infty} \frac{\cos x}{(x^2+a^2)^3}\,dx$
2. $\int_{-\infty}^{+\infty} \frac{(x^3+5x)\sin x}{x^4+10x^2+9}\,dx$
3. $\int_{0}^{+\infty} \frac{x\sin x}{(x^2+a^2)^2}\,dx$
4. $\int_{-\infty}^{+\infty} \frac{(x-1)\cos x}{x^2-4x+5}$
5. $\int_{0}^{\infty} \frac{1-\cos ax}{x^2}\,dx$
6. $\int_{0}^{\infty} \frac{\sin ax}{x(x^2+b^2)}$
7. $\int_{0}^{\infty} \frac{x^2-b^2}{x^2+b^2}\frac{\sin ax}{x}\,dx$
8. $\int_{0}^{\infty} \frac{x-\sin x}{x^3(x^2+a^2)}\,dx$
9. $\int_{-\infty}^{\infty} \frac{\cos x\,dx}{x^2-\pi^2/4}$
10. $\int_{-\infty}^{\infty} \frac{\sin x\,dx}{x(x-3\pi)}$

C. Spočítejte integrály:

1. $\int_0^{\pi} \frac{\cos^2 x}{1-a\sin^2 x}\,dx\,, \quad a \in (0,1)$
2. $\int_0^{2\pi} \frac{dx}{(a+b\cos^2 x)^2}\,, \quad a,b>0$
3. $\int_0^{\pi} \frac{\cos^4 x}{1+\sin^2 x}\,dx$
4. $\int_0^{\pi} \frac{\sin(kx)}{\sin x}\,dx,\ k \in \mathbb{N}$
5. $\int_0^{2\pi} \frac{dx}{5+3\cos x}$
6. $\int_0^{2\pi} \frac{\cos^2 x\,dx}{13+12\cos x}$
7. $\int_0^{2\pi} \frac{dx}{13+12\sin x}$
8. $\int_{-\pi}^{\pi} \frac{\sin^2 x\,dx}{1-2a\cos x+a^2}\,, \quad a>1$

Výsledky.
A1. $-\pi/27$ A2. $\pi/\sqrt{2}$ A3. $\pi/(ab(a+b))$ A4. $\pi(2n-3)!!/(2^{n-1}(n-1)!)$ A5. $\pi/4$ A6. $\frac{5}{12}\,\pi$ A7. 0 A8. $3\pi/8$ A9. $\pi/4$ A10. $3\sqrt{2}\pi/(16a)$ A11. $\pi/(32ab^2\sqrt{ab})$ A12. $\pi(2b+a)/(2ab^3(a+b)^2)$ A13. $4\pi/3$ A14. 0

B1. $\pi e^{-a}(a^2+3a+3)/(16a^5)$ B2. $\pi(e^{-1}+e^{-3})/2$ B3. $\pi e^{-a}/(4a)$
B4. $-\pi\, e^{-1}(\sin(2)-\cos(2))$ B5. $a\pi/2$ B6. $\pi(1-\exp(-ab))/2b^2$
B7. $\pi(2\exp(-ab)-1)/2$ B8. $\pi(a^2-2a+2-2e^{-a})/(4a^4)$
B9. -2 B10. $-2/3$

C1. $\pi(1-\sqrt{1-a})/a$ C2. $\pi(2a^3+5a^2b+4ab^2+b^3)/(2(a+b)^{7/2}a^{3/2})$
C3. $2\pi(\sqrt{2}-5/4)$ C4. π pro k liché, 0 pro k sudé C5. $\pi/2$ C6. $13\pi/45$
C7. $2\pi/5$ C8. π/a^2