D | 3

$$\sum_{n=1}^{\infty} \frac{\cos(\pi n)}{(n^2+1)^2} \quad a = 0{,}001$$

$n=1 \quad \frac{\cos(\pi)}{2^2} = -\frac{1}{4}$ $\quad n=5: \frac{\cos(5\pi)}{26^2} = -\frac{1}{676}$

$n=2 \quad \frac{\cos(2\pi)}{5^2} = \frac{1}{25}$ $\quad n=6: \frac{\cos(6\pi)}{37^2} = \frac{1}{1369}$

$n=3 \quad \frac{\cos(3\pi)}{10^2} = -\frac{1}{100}$ $\quad n=7: \frac{\cos(7\pi)}{50^2} = \frac{-1}{2500}$

$n=4 \quad \frac{\cos(4\pi)}{17^2} = \frac{1}{289}$ $\quad n=8: \frac{\cos(8\pi)}{65^2} = \frac{1}{4225}$

$n=9: \ldots \lesssim \frac{a}{10}$

$$-\frac{1}{4}+\frac{1}{25}-\frac{1}{100}+\frac{1}{289}-\frac{1}{676}+\frac{1}{1369}-\frac{1}{2500}+\frac{1}{4225} \approx 0,$$

$\sum_{n=1}^{\infty} \frac{\cos(\pi n)}{(n^2+1)^2}$ – знакочередующийся

$$|u_{n+1}| = \left|\frac{\cos(\pi(n+1))}{((n+1)^2+1)^2}\right| = \left|\frac{\cos(\pi n+\pi)}{(n^2+2n+2)^2}\right| < \left|\frac{\cos(\pi n)}{(n^2+1)^2}\right|$$

$= |u_n|$

$$\lim_{n\to\infty} \frac{\cos(\pi n)}{(n^2+1)^2} = 0$$

По признаку Лейбница – ряд сходится

$$\sum_{n=1}^{\infty} \frac{n^3 3^n}{(3n-2)^n}$$

$$\lim_{n\to\infty} \sqrt[n]{\frac{n^3 3^n}{(3n-2)^n}} = \lim_{n\to\infty}\left(\frac{3\overbrace{n^{\frac{3}{n}}}^{\to 1}}{3n-2}\right) = 0 < 1 \to \text{сходится}$$

$$\left(\lim_{n\to\infty}\left(n^{\frac{3}{n}}\right) = \lim_{n\to\infty}\left(e^{\frac{3}{n}\ln n}\right) = 1\right)$$