Varianta B

1) • $\sum_{n=1}^{\infty}\underbrace{\left(\frac{2^{n+1}+3^{n-1}+3^{n}}{2^{n-1}+3^{n+2}}\right)^{n}}_{=:a_n}$ konvergira

$$\lim_{n\to\infty}\sqrt[n]{a_n}=\lim_{n\to\infty}\frac{\cancel{3^n}\cdot\left(2\cdot\left(\frac{2}{3}\right)^n+\frac{1}{3}+1\right)}{\cancel{3^n}\cdot\left(\frac{1}{2}\left(\frac{2}{3}\right)^n+9\right)}=\frac{\frac{4}{3}}{9}=\frac{4}{27}\in[0,1)$$

• $\sum_{n=1}^{\infty}\left(\frac{2^{n+1}}{3^{n+2}}+\frac{n!}{3^n}\right)=\frac{2}{9}\cdot\underbrace{\sum_{n=1}^{\infty}\left(\frac{2}{3}\right)^n}_{\text{konvergira}}+\underbrace{\sum_{n=1}^{\infty}\frac{n!}{3^n}}_{\text{divergira}}=\infty$

• $\sum_{n=1}^{\infty}\left(\sqrt{n^2+n}-n\right)$ divergira

$$\left(\sqrt{n^2+n}-n\right)\cdot\frac{\sqrt{n^2+n}+n}{\sqrt{n^2+n}+n}=\frac{\cancel{n}\,1}{\cancel{n}\left(\sqrt{1+\frac{1}{n}}+1\right)}\xrightarrow[n\to\infty]{}\frac{1}{2}\neq 0$$

2) $\sum_{n=1}^{\infty}\underbrace{\frac{2^{3n+2}+2^{3n-2}}{3^{2n-1}+3^{2n+1}}}_{\frac{2^{3n}\left(4+\frac{1}{4}\right)}{3^{2n}\left(\frac{1}{3}+3\right)}}=\frac{\frac{17}{4}}{\frac{10}{3}}\cdot\underbrace{\sum_{n=1}^{\infty}\left(\frac{8}{9}\right)^n}_{\frac{\frac{8}{9}}{1-\frac{8}{9}}=8}=\frac{17}{4}\cdot\frac{3}{10}\cdot 8=\frac{51}{5}$

3) $\lim_{n\to\infty}\left(\frac{n+4}{n+3}\right)^n=\underbrace{\lim_{n\to\infty}\left(1+\frac{1}{n+3}\right)^{n+3}}_{=e}\cdot\underbrace{\lim_{n\to\infty}\left(1+\frac{1}{n+3}\right)^{-3}}_{(1+0)^{-3}=1}=e$

4) $a_{n+2}-a_{n+1}-12a_n=0$

$\lambda^2-\lambda-12=0$

$(\lambda-4)(\lambda+3)=0$

$\lambda=4 \ \vee\ \lambda=-3$

F.S. $4^n, (-3)^n$

$a_n=c_1\cdot 4^n+c_2\cdot(-3)^n$

$a_0=c_1+c_2=0 \quad |\cdot 3$

$a_1=4c_1-3c_2=1$

$7c_1=1$

$\boxed{c_1=\frac{1}{7}}$ $\boxed{c_2=-\frac{1}{7}}$

5) $y=\frac{33}{224}e^{4x}-\frac{25}{189}e^{-3x}-\frac{x^2}{12}+\frac{x}{72}-\frac{13}{864}$