251

$$\lim_{x\to+\infty} \frac{16x^3+x\sqrt{x}+1}{2x+\log x+2}\left(2^{\sqrt{\frac{x^2+1}{4x^2+3}}}-\sqrt{2}\right)=$$

$$=\sqrt{2}\lim_{x\to+\infty}\frac{16x^3+x\sqrt{x}+1}{2x+\log x+2}\cdot$$

$$\cdot\left(\sqrt{\frac{x^2+1}{4x^2+3}}-\frac{1}{2}\right)\cdot\frac{2^{\sqrt{\frac{x^2+1}{4x^2+3}}-\frac{1}{2}}-1}{\sqrt{\frac{x^2+1}{4x^2+3}}-\frac{1}{2}}=$$

$$=\sqrt{2}\log 2\lim_{x\to+\infty}\frac{16x^3+x\sqrt{x}+1}{2x+\log x+2}\left(\sqrt{\frac{x^2+1}{4x^2+3}}-\frac{1}{2}\right)=$$

$$=\sqrt{2}\log 2\lim_{x\to+\infty}\frac{\frac{16x^3+x\sqrt{x}+1}{2x+\log x+2}\left(\frac{x^2+1}{4x^2+3}-\frac{1}{4}\right)}{\sqrt{\frac{x^2+1}{4x^2+3}}+\frac{1}{2}}=$$

$$=\sqrt{2}\lim_{x\to+\infty}\log 2\cdot\frac{16x^3+x\sqrt{x}+1}{2x+\log x+2}\left(\frac{x^2+1}{4x^2+3}-\frac{1}{4}\right)=$$

$$=\sqrt{2}\log 2\cdot\frac{1}{2}$$

$$= \sqrt{2}\log 2 \lim_{x\to+\infty} \frac{\frac{16x^3+x\sqrt{x}+1}{2x+\log x+2} \quad \frac{4x^2+4-4x^2-3}{4(4x^2+3)}}{\sqrt{\frac{x^2+1}{4x^2+3}} + \frac{1}{2}} =$$

$$= \sqrt{2}\log 2 \lim_{x\to+\infty} \frac{\frac{x^3\left(16+\frac{\sqrt{x}}{x^2}+\frac{1}{x^3}\right)}{x\left(2+\frac{\log x}{x}+\frac{2}{x}\right)} \cdot \frac{1}{16x^2+3}}{\sqrt{\frac{x^2+1}{4x^2+3}} + \frac{1}{2}}$$

$$= \sqrt{2}\log 2 \frac{\frac{16}{2}\cdot\frac{1}{16}}{\frac{1}{2}+\frac{1}{2}} =$$

$$= \sqrt{2}\log_2 \frac{1}{2} = \frac{\sqrt{2}}{2}\log 2$$