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

$$\stackrel{\text{L'H}}{=} \lim_{x \rightarrow +\infty} \frac{16x^3 + x\sqrt{x+1}}{2x + \log x + 3} \left(2^{\sqrt{\frac{x^2+1}{4x^2+3}} - \frac{\sqrt{2}}{2}} - 1 \right) =$$

$$\stackrel{\text{L'H}}{=} \lim_{x \rightarrow +\infty} \frac{16 + \frac{\sqrt{x}}{x^2} + \frac{1}{x^3}}{2 + \frac{\log x}{x} + \frac{3}{x}} \cdot x^2 \left(\sqrt{\frac{x^2+1}{4x^2+3}} - \frac{1}{2} \right) \frac{2^{-1}}{\sqrt{\frac{x^2+1}{4x^2+3}} - \frac{1}{2}} =$$

$$\stackrel{\text{L'H}}{=} \lim_{x \rightarrow +\infty} \frac{\sqrt{2} \cdot 16}{2} \lim_{x \rightarrow +\infty} x^2 \frac{\frac{x^2+1}{4x^2+3} - \frac{1}{2}}{\sqrt{\frac{x^2+1}{4x^2+3}} + \frac{1}{2}} \cdot \log 2 =$$

$$= \sqrt{2} \cdot 8 \log 2 \lim_{x \rightarrow +\infty} \frac{x^2 \frac{2x^2+2 - 4x^2-3}{8x^2+6}}{\sqrt{\frac{x^2+1}{4x^2+3}} + \frac{1}{2}} =$$

$$= \sqrt{2} \cdot 8 \log 2 \lim_{x \rightarrow +\infty} \infty = \infty$$