1)

$$\lim_{n \to \infty} \frac{n\sqrt[3]{7n} - \sqrt[4]{81n^8 - 1}}{(n + 4\sqrt{n})(\sqrt{n^2 - 5})} =$$

$$= \lim_{n \to \infty} \frac{\sqrt[3]{7n^4} - \sqrt[4]{81n^8 - 1}}{(n + 4\sqrt{n})(\sqrt{n^2 - 5})}$$

$$\Rightarrow \lim_{n \to \infty} \frac{\dfrac{\sqrt{7} \, n^{\frac{4}{3}}}{n^2} - \dfrac{\sqrt[4]{81n^8 - 1}}{n^2}}{\dfrac{n + 4\sqrt{n}}{n^2} \cdot \dfrac{\sqrt{n^2 - 5}}{n^2}}$$

$$= \lim_{n \to \infty} \frac{\dfrac{\sqrt[3]{7}^{\;\nearrow 0}}{n^{\frac{2}{3}}} - \sqrt[4]{81 - \dfrac{1}{n^8}}^{\;\neq 0}}{1 + \dfrac{4}{\sqrt{n}}^{\;0} \quad 1 - \dfrac{5}{n^2}^{\;0}}$$

$$= \boxed{-3}$$