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Fundamentos matemáticos

Examen Septiembre 2021 [04-09-21]

Ejercicio 1:

$$\lim_{x \to \infty} \frac{\sqrt[4]{16x^2+3}+2}{\sqrt{x+1}+\sqrt{x-1}} \Rightarrow \lim_{x \to \infty} \frac{\sqrt[4]{16x^2+3}}{\sqrt{x+1}+\sqrt{x-1}} \Rightarrow$$

$$\Rightarrow \sqrt[4]{\lim_{x \to \infty} \frac{16x^2+3}{(\sqrt{x-1}+\sqrt{x+1})^4}} \Rightarrow \sqrt[4]{\lim_{x \to \infty} \frac{16x^2+3}{\left(\sqrt{x-1}\left((x-1)^{-1/2}\sqrt{x+1}+1\right)\right)^4}}$$

$$\Rightarrow \sqrt[4]{\left(\lim_{x \to \infty} \frac{16x^2+3}{x^2-2x+1}\right) \lim_{x \to \infty} \frac{1}{\left((x-1)^{-1/2}\sqrt{x+1}+1\right)^4}} \Rightarrow$$

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

$$\Rightarrow \sqrt[4]{16 \lim_{x \to \infty} \frac{1}{\left((x-1)^{-1/2}\sqrt{x+1}+1\right)^4}} \Rightarrow$$

$$\Rightarrow \sqrt[4]{\frac{16}{\lim_{x \to \infty} \left((x-1)^{-1/2}\sqrt{x+1}+1\right)^4}} =$$

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$$\sqrt[4]{16 \frac{1}{\left(\lim\limits_{x \to \infty}\left(\sqrt{\frac{x+1}{x-1}}\right)+1\right)^4}} \Rightarrow$$

$$\Rightarrow \sqrt[4]{16 \frac{1}{\left(\sqrt{\lim\limits_{x \to \infty} \frac{1+\frac{1}{x}}{1-\frac{1}{x}}}+1\right)^4}} \Rightarrow$$

$$\Rightarrow \sqrt{16 \frac{1}{\left(\sqrt{\frac{1}{1}}+1\right)^4}} \Rightarrow \sqrt[4]{\frac{16}{16}} \Rightarrow$$

$$= \boxed{1}$$