

Problem 2

In the following problems, find the limit of the given sequence as $n \rightarrow \infty$.

$$\frac{(n+1)^2}{\sqrt{3+5n^2+4n^4}}$$

Solution

Take the limit as $n \rightarrow \infty$.

$$\begin{aligned}\lim_{n \rightarrow \infty} \frac{(n+1)^2}{\sqrt{3+5n^2+4n^4}} &= \lim_{n \rightarrow \infty} \frac{n^2+2n+1}{\sqrt{n^4\left(\frac{3}{n^4}+\frac{5}{n^2}+4\right)}} \\ &= \lim_{n \rightarrow \infty} \frac{n^2+2n+1}{n^2\sqrt{\frac{3}{n^4}+\frac{5}{n^2}+4}} \\ &= \lim_{n \rightarrow \infty} \frac{1+\frac{2}{n}+\frac{1}{n^2}}{\sqrt{\frac{3}{n^4}+\frac{5}{n^2}+4}} \\ &= \frac{1+0+0}{\sqrt{0+0+4}} \\ &= \frac{1}{2}\end{aligned}$$