$\lim_{n\to\infty} \sqrt[n]{|a_n|} = \lim_{n\to\infty} \dfrac{n^2+6}{3n^2+2} = \lim_{n\to\infty} \dfrac{1+6/n^2}{3+2/n^2} = \dfrac{1}{3} < 1$, so the series $\sum_{n=1}^{\infty} \left(\dfrac{n^2+6}{3n^2+2}\right)^n$ is absolutely convergent by the Root Test.