

Vorl. aufg 4

Berechnung Sie mit den Grenzwertsätzen:

1) $\lim_{n \rightarrow \infty} \frac{2n}{n+3}$

2) $\lim_{n \rightarrow \infty} \frac{3n^2 - 2n^4}{6n^4 + 3n^3 - 1}$

3) $\lim_{n \rightarrow \infty} \frac{1+n^2}{1-n^3}$

Lsg $\lim_{n \rightarrow \infty} \frac{2n}{n+3} = \lim_{n \rightarrow \infty} \frac{2n}{n(1+\frac{3}{n})} = \lim_{n \rightarrow \infty} \frac{2}{1+\frac{3}{n}} = \frac{2}{1+0} = 2$

$$\begin{aligned} \lim_{n \rightarrow \infty} \frac{3n^2 + 2n^4}{6n^4 + 3n^3 - 1} &= \lim_{n \rightarrow \infty} \frac{n^4(\frac{3}{n^2} - 2)}{n^4(6 + \frac{3}{n} - \frac{1}{n^4})} \\ &= \lim_{n \rightarrow \infty} \frac{\frac{3}{n^2} - 2}{6 + \frac{3}{n} - \frac{1}{n^4}} = \frac{-2}{6} = -\frac{1}{3} \end{aligned}$$

$$\begin{aligned} \lim_{n \rightarrow \infty} \frac{1+n^2}{1-n^3} &= \lim_{n \rightarrow \infty} \frac{n^2(\frac{1}{n^2} + 1)}{n^3(\frac{1}{n^3} - 1)} = \lim_{n \rightarrow \infty} \frac{\frac{1}{n^2} + 1}{n(\frac{1}{n^3} - 1)} \\ &= \lim_{n \rightarrow \infty} \frac{1}{n} \cdot \frac{\frac{1}{n^2} + 1}{\frac{1}{n^3} - 1} = 0 \cdot (-1) = 0 \end{aligned}$$

$$\lim_{n \rightarrow \infty} \frac{1+n^2}{1-n^3} = \lim_{n \rightarrow \infty} \frac{n^3(\frac{1}{n^3} + \frac{1}{n})}{n^3(\frac{1}{n^3} - 1)} = \lim_{n \rightarrow \infty} \frac{\frac{1}{n^3} + \frac{1}{n}}{\frac{1}{n^3} - 1} = \frac{0}{-1} = 0$$