

Vorlesungsaufgabe 5

Berechnen Sie

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

b) $\lim_{n \rightarrow \infty} \frac{1}{3^n - \frac{1}{\sqrt{n}}}$

c) $\lim_{n \rightarrow \infty} \frac{\ln(2^n)}{n+1}$

Lsg

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

$= \lim_{n \rightarrow \infty} n \cdot \underbrace{\frac{1+\frac{1}{n}}{\frac{1}{n}-2}}_{\rightarrow -\frac{1}{2}} = -\infty$

b) $\underbrace{3^n}_{\rightarrow \infty} - \underbrace{\frac{1}{\sqrt{n}}}_{\rightarrow 0} \rightarrow \infty$ weil $\sqrt{n} \rightarrow \infty$

$\Rightarrow \lim_{n \rightarrow \infty} \frac{1}{3^n - \frac{1}{\sqrt{n}}} = 0$

c) $\lim_{n \rightarrow \infty} \frac{\ln(2^n)}{n+1}$

$\ln(2^n) = n \cdot \ln(2)$

$= \lim_{n \rightarrow \infty} \frac{n \cdot \ln(2)}{n+1} = \lim_{n \rightarrow \infty} \frac{\ln(2)}{1+\frac{1}{n}} = \ln(2)$