

Annotation for the 5th week

We are going to study two kinds of problems. First, we generalize the previous methods to broader types of sequences. So, we will not work only with fractions involving various powers of n but also objects like $\log n$, 3^n , $n!$ and n^n . E.g. we solve limits of

$$\frac{\sqrt{9^n - 6^{n+1}} - \sqrt{9^n + \log n^2}}{2^n} \quad \text{and} \quad \frac{(7n+2)n^{n-1} + 7^n}{n^n + 3 \cdot n! + \log n}.$$

The main tool here will be the so-called scale (see the exercise sheet).

Second, we need to realize that not all sequences possess a limit; consider e.g.

$$(-1)^n \quad \text{or} \quad \cos \pi n.$$

Here, the crucial tool will be the theorem talking about the limit of a subsequence.

In the remaining time (which will be like 80 minutes) there will be space for you to calculate some limits by yourself and try all these techniques. I will be there to help you.