Annotation for the 4th week

We will start with the new topic - limits of sequences. First, we will understand the definition. You can try to think about the following examples

$$\lim_{n\to\infty} \sqrt[3]{3n}\,, \quad \lim_{n\to\infty} \left(\frac{1}{2}\right)^n, \quad \lim_{n\to\infty} \frac{n+2}{n+1}\,.$$

Next, we will talk about indeterminate forms, i.e. how to work with $\pm\infty$. You can think about why are expressions like $\infty - \infty$ or $\frac{\infty}{\infty}$ not defined. It is closely connected with the theorem about arithmetics of limits.

We will continue with finding limits of things like $n^5 - n^3 + n - 1$ or $\frac{-n+3n^3+\sqrt{n}}{n^2+2\sqrt[3]{n}}$. It is based on identifying the "dominant" term. You can recall the binomial theorem, it can be handy.

Finally, we will deal with the difference of roots, e.g. how to find $\lim_{n\to\infty} \frac{\sqrt{n^2+1}-\sqrt{n^2-1}}{\sqrt{n^4+n^3}-\sqrt{n^4-1}}$.