# Extra homework 4

1. Rearrange the terms in the alternating harmonic series such that the sum is $s \in \overline{\mathbb{R}}$.
2. Let $C_n$ be the number of full binary trees with $n+1$ leaves (known as the Catalan number).
   (a) Find a recurrence relation for $C_n$.
   (b) Considering the generating function $f(x) = \sum_{n=0}^{\infty} C_n x^n$, prove that $C_n = \frac{1}{n+1}\binom{2n}{n}$.

These questions are extra. You will get bonus points for solving them.
Solutions should be uploaded on Teams before the next lecture.