Mathematical analysis I — Homework 8

Due: 15:40, 28.11.

Write your solution of each problem on a separate sheet of paper. One part will be marked for credit.

Problem 1: Find the sum of the following series, if they are convergent:

(a) $\sum_{n=1}^{\infty} \frac{3^{n+1}+(-1)^n}{5^n}$

(b) $\sum_{n=1}^{\infty} \left(\frac{1}{3k-2} - \frac{1}{3k+1}\right)$

Problem 2: Let $\sum_{n=1}^{\infty} a_n = a_1 + a_2 + \dots$ be a convergent series with the sum $s \in \mathbb{R}$. Does the series $\sum_{n=1}^{\infty} b_n$, where $b_n = a_{3n-2} + a_{3n-1} + a_{3n}$ converge? If yes, what is its sum?

Problem 3: **From the previous week.** Compute the limit of a recursively defined sequence $a_1 = 1$ and $a_{n+1} = \frac{1}{2}\left(a_n + \frac{c}{a_n}\right)$, where c is a positive real. Using this, calculate $\sqrt{7}$ with precision to four decimal places. Justify why is your result precise enough without using value of $\sqrt{7}$.

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