

## Mathematical analysis I — Homework 7

**Due: 15:40, 21.11.**

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

*Problem 1:* Find limits of the following sequences

(a)  $\lim_{n \rightarrow \infty} \left(\frac{n-1}{3n}\right)^n$

(b)  $\lim_{n \rightarrow \infty} \left(1 - \frac{1}{n}\right)^{n^2}$

*Problem 2:* Find the limit of the sequence  $\left(\frac{n!-3^n}{n^{10}-2^n}\right)$  or show it does not exist.

*Problem 3: Due date postponed to 28.11.!* 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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