Differential and Integral Calculus 1
MS-A0111
Hakula
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Problem Sheet for Week 37 (B), 2021

NOTE[1]

The due date is published on the course pages. Homework can be submitted only digitally. Instructions on labelling the "papers" can be found on the course pages.

1 Introductory Problems

INTRO 1 Do the following sequences converge or diverge? If a sequence converges, find its limit.

(a) $a_n = (0.8)^n$, (b) $a_n = \dfrac{1-e^{-n}}{1+e^n}$, (c) $a_n = \dfrac{n^2+1}{n}$, (d) $a_n = 1+(-1)^n$.

INTRO 2 Evaluate the limit or explain why it doesn't exist:

$$\lim_{h\to 0} \frac{\sqrt{4+h}-2}{h}.$$

2 Homework Problems

EXERCISE 1 Let the sequence be defined recursively as

$$a_1 = 1, \qquad a_{n+1} = \frac{a_n}{1+a_n}.$$

Show that the sequence converges and find its limit.
Answer: $\lim_{n\to\infty} a_n = 1/2$.

EXERCISE 2 Suppose that f and g are continuous functions on some interval I. Show that the product function $f(x)g(x)$ is also continuous on I.

[1] Published on 2021-09-09 12:04:25+03:00.