Tartalomjegyzék

- 1 numpy Homework
  - 1.1 matrix (2p)
  - 1.2 derivative (3p)
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numpy Homework

help

Implement the following python functions. The name of the exercise should be the name of the function. You will need `import numpy`! On your own computer I recommend Anaconda because it is installed with numpy by default. Mind that you need the 2.7 version. Or you can use the `leibniz`.

matrix (2p)

The function should have 3 parameters, one matrix and two indices:

```
M: a matrix
i: a row index
j: a column index
```

The output should be a matrix (let's call *A*) with the same size as *M*. It should be the outer product of the a^{th} row and the a^{th} column of *M*. In formula:

$$A_{i,j} = M_{i,b} \cdot M_{a,j}$$

You can calculate this kind of product of vectors by multiplying a somethig-by-1 and a 1-by-something matrix.

derivative (3p)

The function should have 3 parameters, two real numbers and one integer:

```
a: the left-hand-side of the interval
b: the right-hand-side of the interval
n: the number of uniformly distributed points in the interval
```

$a < b$ and $n > 1$.

- The output should be a numpy vector of length *n-2* containing the numerical derivative of the function $x \cdot e^x$ on the given interval, except the endpoints.
- Use the following estimation for the derivative (more about numerical differentiation):

$$\Delta f_i = \frac{f(x_{i+1}) - f(x_{i-1})}{x_{i+1} - x_{i-1}}$$

Handing-in

Send the exercises as a python code from your math email account to **`info1hazi@gmail.com`**

You should attach one python file containing the definition of the required functions without any test code or `print` command.

The file should be named:

```
EN1_HW8_<user account>.py
```

the subject of the letter should be the same (without the extension). For me example:

```
EN1_HW8_borbely.py
```

Deadline

12th of May, 29:59