

TFL115 - Exercise 4

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1 Introduction

In this exercise there are assignments which should help you understand what we covered in the lecture. This exercise is not mandatory and should not be delivered, however it will help you manage the mandatory exercise which is introduced later on. Please let us know if there are any problems with the exercise or you feel unable to solve the tasks.

Feel free to use Github or Bitbucket when solving the tasks, but please do use a private repository for the solutions.

Exercises marked with (!) might be a bit hard.

2 Newton's method

- Given the equation:

$$f(x) = x^4 - 16$$

- Use Newton's method to find one of the roots, with an error smaller than 0.1. Choose your own starting point. *Hint:* First find the derivative of $f(x)$. See code from lecture 4 for inspiration.

3 Files

- Create a file called *my_data.txt*
- Write "Hello World" to *my_data.txt*
- Read and print the content of *my_data.txt* *Hint:* `encoding='utf-8'`

4 Writing results to file

- Create a file called *results.txt*

- Create a function named `power_of_four` which takes *one* numerical positional argument called `x`, the function should return x^4 . *Hint:* Previous exercise
- Create a list called `x_values` containing values ranging from 1-20 (1,2,3,...,20) *Hint:* For-loop, append
- Calculate `y` values corresponding to the `x` values using the `power_of_four` function. Store the values in a list.
- Write the pairs of (`x`,`y`) values to `results.txt`, each line should only contain one pair separated by a comma. *Hint:* `write('hello'+'\n')`

5 Largest product in a series

- Download the file `largest_prod_numbers.txt` from Canvas.

The four adjacent digits in the 1000-digit number that have the greatest product are $9 \times 9 \times 8 \times 9 = 5832$.

- Find the five adjacent digits in the 1000-digit number that have the greatest product. What is the value of this product?
- Find the product (still five digits) which is closest to 7777. What is the value of this product? e.g. if the list of products were [5, 8, 12, 1], the product closest to 11 would be 12.
- What is the number of unique products (five digits)?

Hint: slicing, `'2'.isdigit()`, `len()`, `set()`

6 Solutions

6.1 Newton's method: $\pm 2.0xxx$

6.2 Largest product in a series: 40824, 7776, 209