VG101 — Introduction to Computer and Programming

Assignment 1

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- MATLAB: write each exercise in a different file
- C/C++: use the provided assignment template
- Include simple comments in the code
- If applicable, split the code over several functions
- Extensively test your code and impove it
- Write a single README file per assignment
- Zip all the files and upload the archive on Canvas

Ex. 1 — *Writing proper documentation*

Search online what a README file is and what it should contain.

Specifications.

- Answer in the README file
- Provide clear explanations

Ex. 2 — *Basic MATLAB knowledge*

Let $x = \begin{pmatrix} 3 \\ 2 \\ 6 \\ 8 \end{pmatrix}$ and $y = \begin{pmatrix} 4 \\ 1 \\ 3 \\ 5 \end{pmatrix}$

1. Define x and y in MATLAB
2. Add the sum of the elements in x to y
3. Raise each element of x to the power specified by the corresponding element in y
4. Divide each element of y by the corresponding element in x
5. Multiply each element in x by the corresponding element in y, and store the result in a variable z
6. Add up the elements in z and assign the result to a variable w
7. Compute $x' * y - w$ and explain the result

Ex. 3 — *Simple scripting in MATLAB*

Write a simple MATLAB script which converts durations from seconds into days. The input should be represented as a vector of 1000 durations from 60 to 12345987 seconds.

Ex. 4 — *Basic scripting*

The length of a competitive running track is 400 m. Write a MATLAB script which converts a distance into a number of laps. When the number of laps is not an integer also return the number of meters remaining in order to complete one more lap.

e.g. For 1100m the script should return: 2 and 100 (2 laps and 100 m to complete 3 laps).

Specifications.

- The script should display the result
- E.g. for 1100m show 2 and 100, meaning 2 laps and 100 m to complete 3 laps

Ex. 5 — *Algorithms*

Around 240 BC Eratosthenes calculated the circumference of the Earth using basic mathematics and without leaving Egypt.

1. In the README file explain his method, and write a clear algorithm describing it
2. Write a MATLAB script which calculates and displays:
   a) The circumference of the Earth
   b) The radius of the Earth

Ex. 6 — *Vectors*

In Great Britain and Ireland human body weight is often measured in stones. A stone is defined as 14 pounds or 6.35 kg. Write a MATLAB script converting from stones to pounds, from pounds to kg and from kg to stones.

Specifications.

- Prompt the user for a list of values and two units
- Use vectors to store the values

Ex. 7 — *Compact coding*

For each question use a single command line in MATLAB to determine and print:

1. The number of primes between 1 and 100000.
2. The product of 5 random numbers in the range 1 to 10.