Informatics for Astronomers - WS2019

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Exercise sheet 6 - Python Basics and loops and C

Your preparation of exercises should include two aspects:

(1) Try to present exercises in a way that everyone can follow (even if that person didn't do the exercise at all), so please explain all the (vital) parts of your solution in a slow and comprehensive way.

(2) Try to also include some background information where applicable, and/or explain the possible context/motivation for the given exercise.

Please strive for that in all exercises to come. From now on this will also be part of the assessment.

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1. How are *floats* represented in computer memory? (think of basis and exponent). How much memory does a *float* need in the system?
2. The function `sys.getsizeof(object)` returns the size (in bytes) of a `python` object in memory. According to that function, How much memory a *float* uses **in** `python`? Please explain the difference with respect to the the system requirements.
3. Write a Python script that takes a string as a command-line argument and reverses the order of the letters.
4. Assume that these two lists are 3D coordinates:

   ```
   point_1 = [2.8, -4.7, 0.4]
   point_2 = [-8.1, 3.0, -10.6]
   ```

   Write a script that computes the distance between those points (by looping over the individual components)
5. Copy the result of `import this` into a text file. Open the file and print each line.

   Perform also one (or all) of the following operations with the text:

   - Convert the text to upper case.
   - Print the number of characters in each line
   - Replace all single spaces with double ones.
6. Write a simple `C`-script that prints a message of your choice.
7. Bonus: Write questions 4. and 5. with both `for` and `while` loops. Explain the difference.