Preliminary Assignment

"Introduction To Python For Data Science"

Open a fresh .py script in the left pane of Spyder IDE, save it into Code folder and write your answers in it. Keep saving the file regularly.

1) Python Basics

a) Create a docstring and inside of it write: `Answers to Q1.`

Write all of your answers inside this docstring (remember code is supposed to be green indicating that it is going to be ignored by the Python Interpreter).

b) Explain in 1 sentence each:
   i) What is an environment?
   ii) What is a package / library?
   iii) When installing packages, which command is our first choice from the three given: `conda`, `conda-forge`, `pip`?
   iv) What is the name of the Spyder pane which outputs results of executed Python commands?
   v) You would like to assign number 5 to a variable. Is the following assignment correct: `not = 5`? Explain your reasoning.
   vi) Provide operators for: assignment; mathematical equality check, clearly stating which is which.

c) Write out command(s) you would use in your Terminal to import a library `statsmodels` to your `spyder2021` environment. (Assume this library is available under `conda` repository).

d) Explain the difference between operator precedence and operator associativity.

2) Operators – Arithmetic:

Solve the tasks with a single line of code (where possible) and assign the result of your operations to variables with suitable names:

a) Initialise `x` to `15`. Use x inside an equation to obtain y where: $y = 5^3 + x \div 2.5$

b) i) Test if `y` is a positive number (result is a `True` or `False` answer)
   Hint: suggested variable name for storing the answer: `yPositive`.
   ii) Next, test if `y` is even or odd (result is a `True` or `False` answer)
   Hint1: think about using remainder operator.
   Hint2: suggested variable name for storing the answer: `yEven`.

c) Next investigate the difference between *division* and *floor division*:
   i) Divide `67` by `6`.
   ii) Divide `71` by `6`.
   iii) Now use *floor division* to divide `67` by `6`.
   iv) Next use *floor division* to divide `71` by `6`.
   How is the result rounded down (i.e. if division result is `11.1` or `11.8`, what does floor division round it to)?

d) On one line of code find $(5+9)^2$ floor divided by `2`, then find the remainder of the result with `3`. Assign result to a variable, for example, `x1`.
   Next write out the operation again, but this time explicitly place brackets around operations as they are executed based on operator precedence. Assign result to a variable, for example, `x2`. Check that `x1` and `x2` indeed agree.

e) You have a variable: `x3 = 17`. Use shorthand notation to find a floor division of `x3` with `3` which will overwrite variable `x3` to the new value.

f) Make a comment on why does `2**2**4` give a **different** result to parenthesized version `(2**2)**4`?

3) Operators – Relational:

Here you are required to perform a "relational check" of how two variables relate to each other, which results in a logical answer (i.e. `True` or `False`). First create the variables then perform the check using variable names. Establish if:

a) "`abc`" equals to "`abcd`"

b) `17.5` not equal to `17.50` (note we want to check that decimal zero is **not** affecting the equality test result).
Next check `5` (this will default to `integer` type in Python) equality to `5.0` (this is a float type in Python).

c) Execute: `5 < 7 < 9`. How could this line of code also be written?

4) Operators – Logical:

a) Perform an *exhaustive check* (i.e. check all combinations) on how operator **`and`** works. i.e. check the results of expressions:

```
True and True
True and False
False and False
```

b) Do the same for **`or`** logical operator.

c) Check output of not operator for the following expressions:

```
not True
not False
```

d) Let's combine operators on the same line:

i. Examine and explain the execution order of operators in the below expression:
`17 != 5 or 12==12 and 15 < 1`
Create an explicit parenthesised version which is in line with the default operator precedence.

ii. Next analyse the parenthesised version and understand why the result is different to the version without parenthesis:
`(17 != 5 or 12==12) and (15 < 1).`

If you have questions, please email me on eabramova@london.edu. I will only be able to answer qns relating to potential typos or clarifications, and not the assignment qns themselves :)

Good luck! Can't wait to see you in class!