OVAL MONEY QUIZ

Solutions

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EXERCISE 1

The requested program can be found in an attached file, namely `oval_1.py`.

EXERCISE 2

I once had dinner with a philosophy student, who I never met before. I told him I was attending a Master in Data Science and he asked me about the courses I was following. At that time, I was studying probability theory and theoretical statistics. This guy asked me to explain him the difference between the two, since the underlying mathematical concepts appear to be the same (and indeed they are).
In few words, one can say in probability you start from events and get to numbers; while in stats it is viceversa. In fact, when doing probability, you fix a mathematical model to describe the events of interest and then you compute probabilities of those events, that are numerical values. When doing statistics it is the opposite, as you start from (numerical) data and try to understand events.

EXERCISE 3

The requested program can be found in file `oval_3.py`.

EXERCISE 4

The worst case time complexity of QuickSort is $O(n^2)$, that is pretty high if compared to other sorting algorithms. However, the average case complexity is $O(n \log n)$ and there are different ways to implement QuickSort in order to make the realization of the worst case very unlikely. Hence it is generally considered a fast sorting method.

EXERCISE 5

Nowdays one of the core strength of python is the huge availability of libraries. In particular, the amount of scientific libraries is impressive if compared to other languages. In my opinion, despite this can be useful in many situations, here some problems arise.
First, quality of all such libraries is not the same. For example, sometimes documentation is excellent, while sometimes it is very poor and it may then be tricky to employ them properly.
Second, even in high-quality libraries (consider for instance TensorFlow or Matplotlib) there are numerous methods that, in my opinion, simply have too many arguments to be specified. A single line of code becomes a whole program, making the script less readable and intuitive.

EXERCISE 6

Requested script is named `oval_6.sh`. Note that setting `bash` option `globstar` is required to enable the recursive wildcard $**$ (for folders).

EXERCISE 7

Solution to this problem is implemented in script `oval_7.py`. Several comments inside of the code explain its behavior.