Lab 06 - `QuickSort-ing`

Before you come to the lab

1. Read this document carefully to properly prepare for the lab and turn in your lab solution (i.e., your lab report and acoompanying files, as per the instructions presented here).
2. Study Section 5.12
3. Study how to create unit tests in Python https://realpython.com/python-testing/ (https://realpython.com/python-testing/)
4. Research online on how to plot graphs in Python and Jupyter Notebooks using `matplotlib`
5. Revisit Sections 2.6. and 2.7 to brush-up on how to time functions in Python (this was the topic of Lab01)

Prelude

You are required to type in and format your lab report using Jupyter Notebook. The Jupyter Notebook file `Lab-template.ipynb` available in the Lab01 web page in D2L is the Lab Report template you should use for this lab assignment report.

Exercise

1. Create the following folder for your lab06:

```
lab06/
|
├── sorting/
|     └── __init__.py
├── report.ipynb
├── report.html
└── test.py
```

- `__init__.py` should contain the Python code you have developed as solutions for the exercises in this lab assignment.
- `test.py` will contain your test cases.
- `report.ipynb` is your Jupyter Notebook report file. In case you need a Jupyter Notebook lab report template file, the file Lab-template.ipynb is available in the Lab01 web page in D2L.
- `report.html` is the HTML version of your jupyter notebook report

2. Implement the *median-of-three method* (see Section 5.12 of the textbook) for selecting a pivot value as a modification to quickSort (name this function `mo3_quickSort`). Prepare test cases for your `mo3_quickSort` function, as per the directions provided in https://realpython.com/python-testing/ (https://realpython.com/python-testing/).

3. Prepare and run an experiment to verify the following hypothesis

> Canonic `quickSort` is as fast as `mo3_quickSort` when processing large lists of unsorted integers.

4. Lab Assignment Report: In your Jupyter Notebook Lab Assignment Report, include the following content:
   - A section briefly describing your experimental setpup and your choice of setup.
   - Your Python code
   - A graph displaying the timings of `quickSort` and `mo3_quickSort`
   - A brief discussion of the results you have obtained

Preparing to submit your report

1. Ensure you have structured your `lab06` folder as indicated in Section Prelude above.
2. Ensure you have properly created your unit tests in `test.py` in your `lab06` folder.
3. Ensure you have inserted your jupyter notebook report files in your `lab06` folder, as required in item 1 above.
4. Create a zip file of your `lab06` folder.

What to submit

At the Lab web page in D2L, click on `Lab Solution Submission`, then attach and submit **only the zip** file you have created as per the instructions above.