CS 115 - Introduction to Programming in Python

Lab 09

Lab Objectives: Numpy.

Instructions:
- In this lab, you will use Jupyter Notebook.
- Complete the questions in the spaces provided and upload the solution to Moodle when finished.

NOTE: For the following questions, you should not use loops or if statements!

1. Download the files `covid_data.txt` and `covid_country.txt` from Moodle.
2. The file covid_data.txt has 3 rows. Rows 1 – 3 contain the following: total cases per 1 million, total deaths per 1 million, tests per 1 million.
3. The file covid_country.txt has a heading row and 2 columns, the first contains country names, and the second the continent.
4. The two files are parallel and contain the data for the same countries.
5. Create a python file, `yourname_Lab09_Q2.py` that does the following (see sample run on next page):
   a. Load the data from the file covid_data.txt into a numpy array, `covid_data`.
   b. Load the data from the file covid_country.txt into a numpy array, `covid_country`.
   c. Transpose and update the `covid_data` array.
   d. Calculate and display the average cases per 1 million.
   e. Display the names of the countries in Europe.
   f. Display the names of the countries with cases per 1 million over 10000.
   g. Calculate and display the maximum deaths per 1 million for Asia.
   h. Display the name of the country/ countries with the maximum deaths per million in Asia (note: there may be more than one country with the same maximum, but they may not all be in Asia, you should only display those in Asia).
   i. Create a new array, `test_country`, where the first column contains country names, and the second column contains the tests per 1 million. Hint: your new array should have 2 columns and 172 rows, not 172 columns and 2 rows.
   j. Output the data in `test_country` to a file, `test_data.txt`.

Sample Run:

```
Average cases per 1 million: 3642.6

Countries in Europe: ['Russia' 'Spain' 'UK' 'Italy' 'Germany' 'France' 'Sweden' 'Ukraine'
 'Belgium' 'Belarus' 'Romania' 'Netherlands' 'Portugal' 'Poland'
 'Switzerland' 'Serbia' 'Moldova' 'Ireland' 'Austria' 'Czechia' 'Denmark'
 'Bosnia_Herzegovina' 'Bulgaria' 'North_Macedonia' 'Norway' 'Finland'
 'Luxembourg' 'Albania' 'Croatia' 'Greece' 'Hungary' 'Montenegro'
 'Slovakia' 'Slovenia' 'Lithuania' 'Estonia' 'Iceland' 'Latvia' 'Malta'
 'Andorra' 'San_Marino' 'Channel_Islands' 'Isle_of_Man' 'Monaco'
 'Liechtenstein']

Countries with over 10000 cases per 1 million:
 ['USA' 'Brazil' 'Peru' 'Chile' 'Qatar' 'Oman' 'Panama' 'Kuwait' 'Bahrain'
 'Armenia' 'French_Guiana' 'Luxembourg' 'Mayotte' 'Andorra' 'San_Marino']

Maximum deaths per 1 million in Asia:  260.0
Country with maximum deaths per 1 million in Asia: Armenia
```