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.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 maximum tests per 1 million.
    e. Display the names of the countries in Asia.
    f. Display the names of the countries with less than 50 deaths per 1 million.
    g. Calculate and display the average deaths per 1 million for Europe.
    h. Display the name of the country/countries with the minimum total cases per million in Europe. (note: there may be more than one country with the same minimum, but they may not all be in Europe, you should only display those in Europe).
    i. Create a new array, `test_result`, where the first column contains country names, and the second column contains the total cases 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_result` to a file, `test_data.txt`.

Sample Run:

```
Maximum test per 1 million: 995282.0
Countries in Asia: ['India' 'Iran' 'Saudi_Arabia' 'Pakistan' 'Bangladesh' 'Turkey' 'Iraq'
 'Philippines' 'Indonesia' 'Qatar' 'Kazakhstan' 'Oman' 'Israel' 'Kuwait'
 'UAE' 'Singapore' 'Bahrain' 'Japan' 'Armenia' 'Kyrgyzstan' 'Afghanistan'
 'Azerbaijan' 'Uzbekistan' 'Nepal' 'South_Korea' 'Palestine' 'Malaysia'
 'Lebanon' 'Maldives' 'Hong_Kong' 'Thailand' 'Sri_Lanka' 'Jordan' 'Cyprus'
 'Georgia' 'Vietnam' 'Taiwan' 'Myanmar' 'Brunei']
Countries with less than 50 deaths per 1 million:
 ['India' 'Pakistan' 'Bangladesh' 'Philippines' 'Indonesia' 'Egypt'
 'Ukraine' 'UAE' 'Singapore' 'Poland' 'Nigeria' 'Japan' 'Ghana'
 'Afghanistan' 'Azerbaijan' 'Morocco' 'Uzbekistan' 'Kenya' 'Venezuela'
 'Nepal' 'Costa_Rica' 'Ethiopia' 'Australia' 'Czechia' 'Cameroon'
 'Ivory_Coast' 'South_Korea' 'Palestine' 'Madagascar' 'Sudan' 'Senegal'
 'Norway' 'Malaysia' 'Gabon' 'Guinea' 'Haiti' 'Zambia' 'Mauritania'
 'Paraguay' 'Lebanon' 'Croatia' 'Greece' 'Libya' 'Maldives' 'CAR' 'Malawi'
 'Zimbabwe' 'Hong_Kong' 'Thailand' 'Eswatini' 'Sri_Lanka' 'Cuba'
 'Cabo_Verde' 'Namibia' 'Mali' 'Slovakia' 'South_Sudan' 'Lithuania'
 'Estonia' 'Mozambique' 'Rwanda' 'Suriname' 'Guinea-Bissau' 'Benin'
 'Iceland' 'Tunisia' 'New_Zealand' 'Angola' 'Uruguay' 'Latvia' 'Jordan'
 'Uganda' 'Cyprus' 'Georgia' 'Niger' 'Togo' 'Jamaica' 'Malta' 'Gambia'
 'Botswana' 'Bahamas' 'Vietnam' 'Lesotho' 'Reunion' 'Guyana' 'Taiwan'
 'Burundi' 'Myanmar' 'Mauritius' 'Guadeloupe' 'Martinique' 'Aruba'
 'Trinidad_Tobago' 'Cayman_Islands' 'Papua_New_Guinea' 'Brunei' 'Barbados'
 'Antigua_Barbuda' 'Liechtenstein' 'Belize' 'Curacao' 'Fiji']
Average cases per 1 million in Europe:  4075.3555555555554
Country with minimum total cases per 1 million in Europe: Slovakia
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