DMA Python Support - Exercise

# Week 1 Exercise: Python

Please attempt as many of the questions as you can based on the lab sessions. Feel free to use the slides above if you need help/examples. Record your work in a Colab notebook and share it with me: [thapak2@lsbu.ac.uk](mailto:thapak2@lsbu.ac.uk)

**Lists**

1. Write a Python function that takes a list of integers as input and returns the sum of all the even numbers in the list.
2. Write a Python function that takes two lists as input and returns a new list containing only the elements that are present in both lists.

**Sets**

1. Write a Python function that takes two sets as input and returns a new set containing only the elements that are present in the first set but not in the second.
2. Write a Python function that takes a list of integers as input and returns a set containing only the unique elements in the list.

**Tuples**

1. Write a Python function that takes a tuple of strings as input and returns a new tuple with the same strings, but sorted in alphabetical order.
2. Write a Python function that takes two tuples as input and returns a new tuple containing only the elements that are present in both tuples.

**Dictionaries**

1. Write a Python function that takes a dictionary as input and returns a new dictionary with the keys and values swapped.
2. Write a Python function that takes a list of dictionaries as input and returns a new dictionary with the sum of the values for each key across all the dictionaries.

**String** **Formatting**

1. Write a Python function that takes a string as input and returns a new string with every other character removed.
2. Write a Python function that takes a dictionary as input and returns a formatted string using the keys and values.

**For** **Loop** **and** **Range**

1. Write a Python function that takes an integer as input and prints a countdown from that number to 0 using a for loop and range.
2. Write a Python function that takes a list of strings as input and prints each string in the list with its index using a for loop and range.

**While** **Loop**

1. Write a Python function that takes an integer as input and prints the sum of all the integers from 0 to that number using a while loop.
2. Write a Python function that takes a list of strings as input and prints each string in the list until it reaches a string that starts with the letter 'z' using a while loop.

**Conditionals**

1. Write a Python function that takes a list of integers as input and returns the sum of all the positive numbers and the product of all the negative numbers.
2. Write a Python function that takes a list of strings as input and returns a new list containing only the strings that have a length greater than 5 or start with the letter 'a'.

**Functions**

1. Write a Python function that takes two numbers as input and returns the sum, difference, product, and quotient of the two numbers.
2. Write a Python function that takes a list of strings as input and returns a new list with all the vowels removed from each string.

# Week 1 Exercise: Pandas

Please attempt as many questions as possible. Use [this notebook](https://colab.research.google.com/drive/1DrmHJf90MNfS6A3dL_NClMuI1njhiG60?usp=sharing) for help/examples if you need. Record your answers in a Colab notebook.

1. Create a DataFrame with some negative numbers and use a method to return a new DataFrame with only positive numbers.
2. Create two DataFrames of the same shape with random values and use a method to return a new DataFrame that is the sum of the two original DataFrames.
3. Create a DataFrame with some columns and use a method to add a prefix to the column names.
4. Create a DataFrame with some columns and use a method to add a suffix to the column names.
5. Return the memory usage of the DataFrame.
6. Create a DataFrame and use a method to return a new DataFrame with the absolute difference between each value and the mean.
7. Create a DataFrame with some missing values and use a method to return a new DataFrame with the missing values filled with a specified value.
8. Return the correlation between columns.
9. Create a DataFrame and use a method to return a new DataFrame with only the rows where a specific column contains a certain value.
10. Create a DataFrame with some duplicated values and use a method to return a new DataFrame with only the unique rows.
11. Create a DataFrame and use a method to return the top N largest values in a specific column.
12. Create a DataFrame and use a method to return a new DataFrame with a specific column converted to a different data type.
13. Create a DataFrame and use a method to return a new DataFrame with all null values replaced with the previous value in the column.
14. Create a DataFrame and use a method to return a new DataFrame with the rows sorted by a specific column in descending order.
15. Create a DataFrame with some missing values and use a method to return a new DataFrame with the missing values filled with the mean of the column.
16. Create a DataFrame and use a method to drop all rows that contain at least one missing value.
17. Create a DataFrame and use a method to return a new DataFrame with all column names in lowercase.
18. Create a DataFrame and use a method to return a new DataFrame with all column names in uppercase.
19. Create a DataFrame with some duplicate rows and use a method to return a new DataFrame with only the first occurrence of each row.
20. Create a DataFrame with some missing values and use a method to interpolate the missing values using linear interpolation.
21. Create a DataFrame and use a method to return a new DataFrame with a specific column removed.
22. Create a DataFrame with some missing values and use a method to drop all rows that contain only missing values.
23. Return a new DataFrame with the rows grouped by a specific column.
24. Return a new DataFrame with all values converted to a different data type.
25. Create a DataFrame with some negative values and use a method to return a new DataFrame with all values replaced with their absolute values.
26. Create a DataFrame and use a method to return a new DataFrame with the rows sorted by a specific column in ascending order.
27. Create a DataFrame and use a method to return a new DataFrame with all rows and columns transposed.
28. Create a DataFrame and use a method to return a new DataFrame with only the rows where all values are non-null.
29. Create a DataFrame and use a method to return a new DataFrame with only the columns where at least one value is non-null.
30. Create a DataFrame and use a method to return a new DataFrame with all values rounded to a specific number of decimal places.