DMA Python Support - Exercise

**Python slides:**

* [Creating your first program](https://docs.google.com/presentation/d/1Flq0dEa7zJEdSsQ00-lqkNJ0howKt6gUSPm8P1wcK8Q/edit?usp=share_link)
* [Keywords, Identifiers & Variables](https://docs.google.com/presentation/d/11k0CzHwlAdMb5cqSWRlggf5yb8xM7QLLLn-wkA30Tgk/edit?usp=share_link)
* [Statements, Expressions & Indentation](https://docs.google.com/presentation/d/1cofGW1ZWeslrW4mqUb0n3g2M2zSlbxp4P40UfaoLuWs/edit?usp=share_link)
* [Comments & Docstrings](https://docs.google.com/presentation/d/1yKlDhoVwrKhwR2Mjbi4KFZcOwzt9YzO_bZeGu02Ad0g/edit?usp=share_link)
* [Operators](https://docs.google.com/presentation/d/1wRlJ2dvwoueW48opM_OPpmrEiGs_dsJ1tpepc6l9q8Q/edit?usp=share_link)
* [Operator Precedence & Associativity](https://docs.google.com/presentation/d/1qptLb3NXC_iZvl8Q547f8t0tcOm_LEaTFgjdAACOgww/edit?usp=share_link)
* [Data Types](https://docs.google.com/presentation/d/1_xb4RAVsJ30dKFcPnTrYVpkUEKMGV5X52_b6V9bceV4/edit?usp=share_link)
* [Strings](https://docs.google.com/presentation/d/10nN_gcdvakFsFdvqF1y0Jxn-Gi1dx7VkXR0Lo7to4hc/edit?usp=share_link)
* [Numbers](https://docs.google.com/presentation/d/1H1tC8oq6CEkuPfbvx4NWMTLZooVskGvXdsecbFnhZhU/edit?usp=share_link)

# 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)

1. Write a program that prints all the keywords in Python. (Keywords)
2. Create a program that asks the user for their name, and then greet them by printing "Hello, [name]!" (Variables)
3. Write a program that declares 10 variables with names that break the naming rules in Python and see what errors you get. (Identifiers)
4. Create a program that checks if a number is even or odd, and prints the result. (Statements & Expressions)
5. Write a program that creates a pyramid of asterisks of a height specified by the user. (Indentation)
6. Write a program that calculates the area of a circle and include a docstring explaining what the program does. (Comments & Docstrings)
7. Create a program that takes a list of numbers and returns the sum of all numbers in the list. Include comments explaining how the program works. (Comments & Docstrings)
8. Write a program that calculates the interest earned on a savings account after a specified number of years. (Operators)
9. Create a program that takes two numbers from the user and finds the maximum of the two numbers. (Operators)
10. Write a program that calculates the result of the following expression: 2 + 3 \* 4 / 2 (Operator Precedence & Associativity)
11. Create a program that calculates the result of the following expression: (2 + 3) \* 4 / 2 (Operator Precedence & Associativity)
12. Write a program that calculates the result of the following expression: 2 \*\* 3 \*\* 2 (Operator Precedence & Associativity)
13. Write a program that takes a list of numbers and returns the average of all numbers in the list. (Data Types)
14. Create a program that takes a string from the user and checks if it is a palindrome. (Data Types)
15. Write a program that takes a string from the user and returns the number of vowels in the string. (Data Types)
16. Write a program that takes a string from the user and reverses it. (Strings)
17. Create a program that takes a string from the user and removes all spaces in the string. (Strings)
18. Write a program that takes a string from the user and counts the number of words in the string. (Strings)
19. Write a program that calculates the factorial of a number. (Numbers)
20. Create a program that calculates the greatest common divisor (GCD) of two numbers. (Numbers)

# Week 1 Exercise: Pandas

Please attempt as many questions as possible. Use [this notebook](https://colab.research.google.com/drive/1JukSiIOicmHE3foFujDpJc1IIsmfFToj?usp=share_link) for help/examples if you need. Record your answers in a Colab notebook.

1. concat: Create two Pandas DataFrames with the same columns but different data. Use the concat function to combine the two DataFrames into one DataFrame.
2. cut: Load a dataset of customer heights in inches and use the cut function to bin the heights into different categories (e.g. "short", "average", "tall").
3. date\_range: Use the date\_range function to generate a range of dates starting from today and ending in 30 days, and create a Pandas DataFrame with a single column containing the dates.
4. eval: Load a dataset of stock prices and use the eval method to calculate the returns (percentage change) for each day.
5. get\_dummies: Load a dataset of customer genders and use the get\_dummies function to one-hot encode the genders.
6. infer\_freq: Load a dataset of daily temperatures and use the infer\_freq function to automatically infer the frequency of the data (e.g. daily, weekly, monthly).
7. interval\_range: Use the interval\_range function to generate a range of intervals with a specified start, end, and step, and create a Pandas DataFrame with a single column containing the intervals.
8. isna: Load a dataset with missing values and use the isna method to identify the missing values.
9. isnull: Load a dataset with missing values and use the isnull method to count the number of missing values.
10. merge: Load two datasets with different columns but related data and use the merge function to combine the datasets into one DataFrame.
11. notna: Load a dataset with missing values and use the notna method to identify the non-missing values.
12. notnull: Load a dataset with missing values and use the notnull method to count the number of non-missing values.
13. pivot\_table: Create a program that takes a pandas dataframe and generates a pivot table from the data, aggregating the values based on specified columns.
14. plotting: Create a program that takes a pandas dataframe and creates a bar plot, line plot, and scatter plot of the data.
15. qcut: Create a program that takes a pandas series and creates quantile bins from the values, creating a categorical variable from the numerical data.
16. read\_csv: Create a program that reads a CSV file and displays the first 5 rows of the data.
17. read\_excel: Create a program that reads an Excel file and displays the first 5 rows of the data.
18. read\_html: Create a program that reads an HTML table from a website and displays the first 5 rows of the data.
19. read\_json: Create a program that reads a JSON file and displays the first 5 entries of the data.
20. read\_pickle: Create a program that reads a pickled file and displays the first 5 rows of the data.
21. to\_datetime: Create a program that takes a pandas series and converts the values to datetime objects.
22. to\_numeric: Create a program that takes a pandas series and converts the values to numerical data.
23. unique: Create a program that takes a pandas series and returns the unique values in the data.
24. value\_counts: Create a program that takes a pandas series and returns the frequency counts of each unique value in the data.