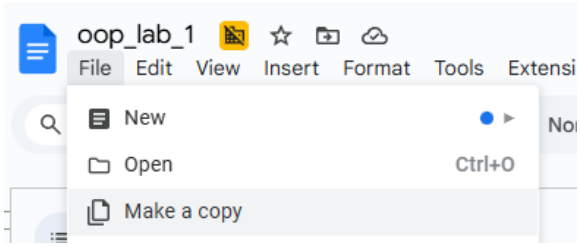
219114/115 Programming I

OOP programming laboratory 1

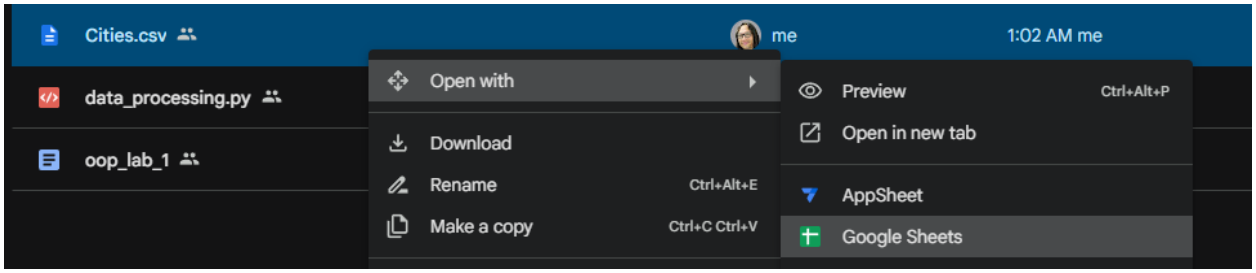
Make a copy of this lab (File->Make a copy) and answer the questions posted in this lab there



You will need to access files from the following link:
oop_lab_1

Google Sheets

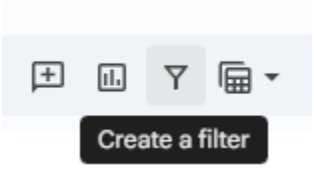
- Open the Cities.csv file with Google Sheets

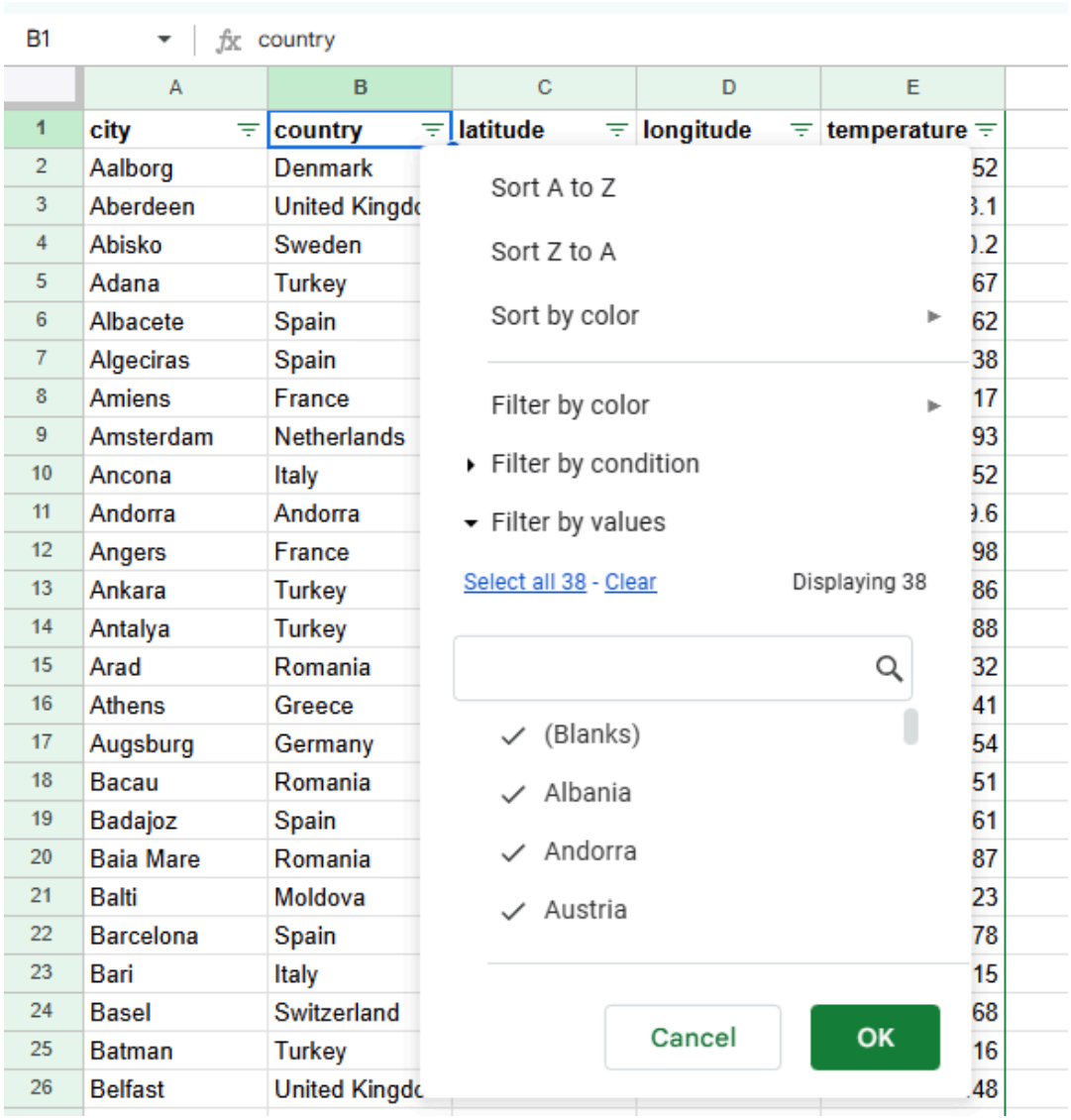


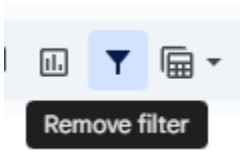
Filtering

➢ List all cities in Germany

➢ List cities in Spain with a temperature above 12°C



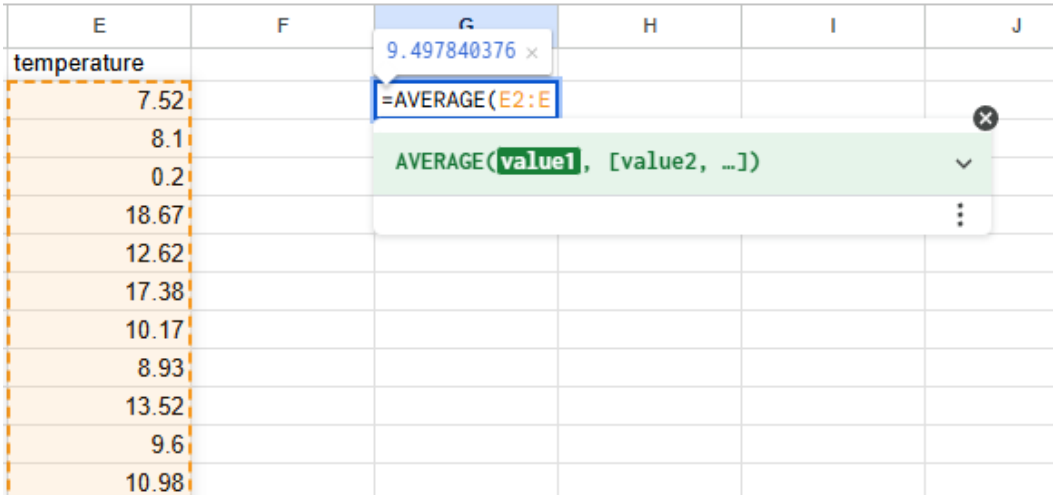




(when done)

Aggregation

- What is the average temperature across all cities?
- Count the number of unique countries



Filtering + Aggregation

(Hint: filter and make a copy to another sheet, then aggregate)

- ➢ What is the average temperature for all the cities in Germany
- ➢ What is the max temperature for all the cities in Italy

<u>Answer the following questions:</u>

- Find the maximum latitude
- Find cities north of 50° latitude and west of 5° longitude
- Show cities where temperature is below 10°C and country is not Sweden
- What is the lowest temperature recorded in this table?
- Retrieve cities with latitude greater than 45° and temperature between 5°C and 12°C.
- Find cities in France or Italy with latitude above 45°.
- List cities whose names start with “A” and are located east of longitude 0°.
- Show the country with the highest average city temperature.
- For each country, count cities with temperatures above 10°C.
- Find the coldest city in Spain

Python code

Commit 1

- On your local computer, create a git repository called oop_lab_1
- Copy the following files to that directory:
  - data_processing.py
  - Cities.csv
- Open and run data_processing.py and observe the outcome
- Study the code and see if you understand it
- Complete the part marked **''' Your code here '''**

- Once done, commit the two files to your local and remote repository with a message like ‘Initial commit for data processing code’

Commit 2

- Code in commit 1 leaves room for refactoring
- Study the lambda functions from the following link:

https://realpython.com/python-lambda/

- Let’s now define two functions:

```
# Let's write a function to filter out only items that meet the
condition
# Hint: condition will be associated with an anonymous function,
e.x., lamdbda x: max(x)
def filter(condition, dict_list):

# Let's write a function to do aggregation given an aggregation
function and an aggregation key
def aggregate(aggregation_key, aggregation_function, dict_list):
```

- Use the two functions to get the same actions as code in Commit 1

```
# Print the average temperature of all the cities

# Print all cities in Germany

# Print all cities in Spain with a temperature above 12°C

# Count the number of unique countries

# Print the average temperature for all the cities in Germany

# Print the max temperature for all the cities in Italy
```

- Once you are done, make another commit to your local and remote repo with a meaningful message to go with it, e.g., “Refactor the code into a procedural style code.”
- Go to your TAs to show your commit history in your Github repository so that they can check you off for this second task

Answer the following questions:

- Paste the link to your oop_lab_1 Github repository here

Preparing for Commit 3

- We want to turn the code in Commit 2 from a procedural-style code into an OOP-style code
- Let's think what you have to do:
  - Probably need a "DataLoader" class to load a csv file and convert them into a Table
  - Probably need a "Table" class
  - What operations are needed in that class
  - How do we define __init__ in that class