ELEC 4511/5511

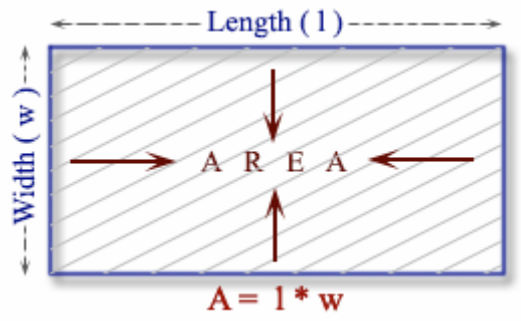
Lab 2

Classes, JSON, Pandas

Problem 1 (Classes):

[Part 1] Rectangle Class

Write a Python class named "**Rectangle**", which consists of two parameters, length and width, and a function to calculate the area of a rectangle.



The template is given below:

```
class Rectangle():
        def __init__(…):
            …
            …
        def rectangle_area(…):
            …
```

And the example of use:

```
newRectangle = Rectangle(12, 10)
print(newRectangle.rectangle_area())
```

```
120
```

[Part 2] Circle Class

Write a Python class named "**Circle**", which consists of a parameter, **radius** and two functions to calculate the area and circumference of a circle, respectively. We assume the center is (0,0) in x-y coordinates.

The template is given below:

```
class Circle ():
        def __init__(…):
            …
            …
        def area(…):
            …
            …
        def circumference (…):
            …
```

And the example of use:

```
NewCircle = Circle(8)
print(NewCircle.area())
print(NewCircle.circumference())
```

```
200.96
50.24
```

Problem 2 (JSON):

Please write a python function called "**create_json**" to ask the user for information and add the new item to the JSON file called "**information.json**". Please note that only after the system receives the "done" message, the program will stop asking the user and save all input to a JSON file. Otherwise, the system will continue to ask for user input.

For example:

```
In [9]: create_json()
        Enter an item or type "done" to quit:
        >>"1": {"class": "Hardware and Software", "Name": "Rohit", "Score": 99}
        Enter an item or type "done" to quit:
        >>"2": {"class": "Logic Lab", "Name": "Tom", "Score": 88}
        Enter an item or type "done" to quit:
        >>"3": {"class": "Computer Vision", "Name": "Jack", "Score": 98}
        Enter an item or type "done" to quit:
        >>done
Out[9]: {'1': {'Name': 'Rohit', 'Score': 99, 'class': 'Hardware and Software'},
         '2': {'Name': 'Tom', 'Score': 88, 'class': 'Logic Lab'},
         '3': {'Name': 'Jack', 'Score': 98, 'class': 'Computer Vision'}}
```

Hint: Create an empty dictionary and update it until the user stops typing. Then convert and save the dictionary into a JSON file.

Problem 3 (Pandas):

Please download the excel file called ***employee.xlsx*** from Canvas first.

[Part 1] Reading Excel data and Comparing Dates.

Write a Python program to use Pandas library to import excel data into a Dataframe and find the list of employees whose *hire_date* is after 01-01-07.

Expected Output:

	emp_id	first_name	last_name	hire_date
4	104	Bruce	Ernst	2007-05-21
7	107	Diana	Lorentz	2007-02-07
13	113	Luis	Popp	2007-12-07
19	119	Karen	Colmenares	2007-08-10

[Part 2] Sorting Records

Write a Python program to import the same Excel data and sort the records by the *hire_date* column.

Expected Output:

	emp_id	first_name	last_name	hire_date
hire_date				
2003-06-17	100	Steven	King	2003-06-17
2005-09-21	101	Neena	Kochhar	2005-09-21
2001-01-13	102	Lex	De Haan	2001-01-13
2006-01-03	103	Alexander	Hunold	2006-01-03
2007-05-21	104	Bruce	Ernst	2007-05-21
2005-06-25	105	David	Austin	2005-06-25
2006-02-05	106	Valli	Pataballa	2006-02-05
2007-02-07	107	Diana	Lorentz	2007-02-07
2002-08-17	108	Nancy	Greenberg	2002-08-17
2002-08-16	109	Daniel	Faviet	2002-08-16
2005-09-28	110	John	Chen	2005-09-28
2005-09-30	111	Ismael	Sciarra	2005-09-30
2006-03-07	112	Jose Manuel	Urman	2006-03-07
2007-12-07	113	Luis	Popp	2007-12-07
2002-12-07	114	Den	Raphaely	2002-12-07
2003-05-18	115	Alexander	Khoo	2003-05-18
2005-12-24	116	Shelli	Baida	2005-12-24
2005-07-24	117	Sigal	Tobias	2005-07-24
2006-11-15	118	Guy	Himuro	2006-11-15
2007-08-10	119	Karen	Colmenares	2007-08-10

[Part 3] Filtering on a Date Rang

Write a Python program to import the same Excel data and find a list of employees whose *hire_date* is between Jan-2005 and Dec-2006.

Expected Output:

	emp_id	first_name	last_name	hire_date
1	101	Neena	Kochhar	2005-09-21
3	103	Alexander	Hunold	2006-01-03
5	105	David	Austin	2005-06-25
6	106	Valli	Pataballa	2006-02-05
10	110	John	Chen	2005-09-28
11	111	Ismael	Sciarra	2005-09-30
12	112	Jose Manuel	Urman	2006-03-07
16	116	Shelli	Baida	2005-12-24
17	117	Sigal	Tobias	2005-07-24
18	118	Guy	Himuro	2006-11-15

[Part 4] Changing the Index to 'hire_date'

Write a Python program to import the same Excel data and convert the data to use the *hire_date* as the index.

[Part 5] Importing Multiple Sheets and Writing to a Single File

Write a Python program and use Pandas to import three sheets from a given Excel file and write the data to a new single-sheet Excel file called *employee_new.xlsx*.

Canvas submission: Please submit your report in ".**pdf**" file format and compress your codes into a "**.zip**" file.

What needs to be included in your report:

1. Screenshots of the results you get after running each program.
2. Copy and paste your code. And write comments for each function.
3. Please write a short analysis of each problem, mainly explaining how you think about the design of the function, what troubles you encountered during the design process, and how you finally solved them, etc.

What needs to be included in your "**.zip**" file:

Your Python code (.py file) for each problem.