Fundamentals of Computer Programming

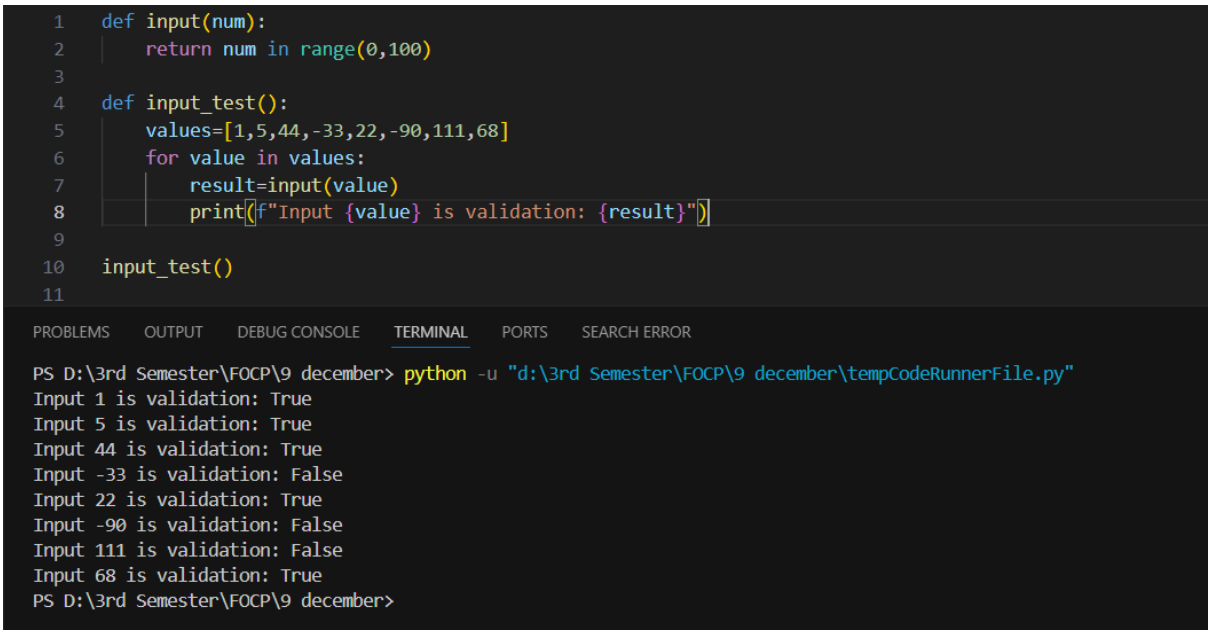
Building a Programming Portfolio

Week 4

You should be able to complete the following programs by the end of the week. You should keep the code somewhere safe, in an organised way. GitHub is ideal. Wherever you choose, you should ensure that the work is safe and backed up.

Possible solutions will be uploaded to the main module GitHub repository every week. If you follow that repo you should be able to receive notifications.

1. Functions are often used to validate input. Write a *function* that accepts a single integer as a parameter and returns `True` if the integer is in the range 0 to 100 (inclusive), or `False` otherwise. Write a short program to test the function.



```
def input(num):
    return num in range(0,100)

def input_test():
    values=[1,5,44,-33,22,-90,111,68]
    for value in values:
        result=input(value)
        print(f"Input {value} is validation: {result}")

input_test()
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  SEARCH ERROR

PS D:\3rd Semester\FOCP\9 december> python -u "d:\3rd Semester\FOCP\9 december\tempCodeRunnerFile.py"
Input 1 is validation: True
Input 5 is validation: True
Input 44 is validation: True
Input -33 is validation: False
Input 22 is validation: True
Input -90 is validation: False
Input 111 is validation: False
Input 68 is validation: True
PS D:\3rd Semester\FOCP\9 december>
```

2. Write a function that has a single string as its parameter, and returns the number of uppercase letters, and the number of lowercase letters in the string. Test the function with a short program.

```python
def upper_or_lower(string):
    uppercase=0
    lowercase=0
    for char in string:
        if char.isupper():
            uppercase+=1
        elif char.islower():
            lowercase+=1
        else:
            pass

    print(f"uppercase letters: {uppercase}")
    print(f"lowercase letters: {lowercase}")

upper_or_lower("Happy New Year")
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  SEARCH ERROR

PS D:\3rd Semester\FOCP\9 december> python -u "d:\3rd Semester\FOCP\9 december\tempCodeRunnerFile.py"
uppercase letters: 3
lowercase letters: 9
PS D:\3rd Semester\FOCP\9 december>
```

3. Modify your "greetings" program so that the first letter of the name entered is always in uppercase with the rest in lowercase. This should happen even if the user entered their name differently. So if the user entered `arthur`, `ARTHUR`, or even `arTHur` the name should be displayed as `Arthur`.

```python
def capital(str):
    return str.capitalize()

name=str(input("enter your name:"))

print(capital(name))
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  SEARCH ERROR

PS D:\3rd Semester\FOCP\9 december> python -u "d:\3rd Semester\FOCP\9 december\tempCodeRunnerFile.py"
enter your name:aRyAnnnN
Aryannnn
PS D:\3rd Semester\FOCP\9 december>
```

4. When processing data it is often useful to remove the last character from some input (it is often a newline). Write and test a function that takes a string parameter and returns it with the last character removed. (If the string contains one or fewer characters, return it unchanged.)

```python
def last_char(string):
    if len(string)>1:
        return string[:-1]
    return string

print(last_char("Apple"))
print(last_char("A"))
print(last_char(""))

```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  SEARCH ERROR

PS D:\3rd Semester\FOCP\9 december> python -u "d:\3rd Semester\FOCP\9 december\tempCodeRunnerFile.py"
Appl
A

PS D:\3rd Semester\FOCP\9 december>
```

5. Write and test a function that converts a temperature measured in degrees centigrade into the equivalent in fahrenheit, and another that does the reverse conversion. Test both functions. (Google will find you the formulae).

```python

def celsius_to_fahrenheit(celsius):
    fahrenheit = celsius * (9/5) + 32
    return fahrenheit

def fahrenheit_to_celsius(fahrenheit):
    celsius = (fahrenheit - 32) * (5/9)
    return celsius

c_to_f=(celsius_to_fahrenheit(99))
f_to_c=(fahrenheit_to_celsius(36))
print(f"{c_to_f:.2f}")
print(f"{f_to_c:.2f}")

```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  SEARCH ERROR

PS D:\3rd Semester\FOCP\9 december> python -u "d:\3rd Semester\FOCP\9 december\tempCodeRunnerFile.py"
210.20
2.22
PS D:\3rd Semester\FOCP\9 december>
```

6. Write a program that takes a centigrade temperature and displays the equivalent in fahrenheit. The input should be a number followed by a letter `C`. The output should be in the same format.

```python

temp=input("Enter a temperature in Celsius")

if temp[-1].upper()=='C':
    print(f"{celsius_to_fahrenheit(float(temp[:-1]))} F")
else:
    print("Invalid format")

import statistics
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  SEARCH ERROR

PS D:\3rd Semester\FOCP\9 december> python -u "d:\3rd Semester\FOCP\9 december\tempCodeRunnerFile.py"
210.20
2.22
Enter a temperature in Celsius23C
73.4 F
PS D:\3rd Semester\FOCP\9 december>
```

7. Write a program that reads 6 temperatures (in the same format as before), and displays the maximum, minimum, and mean of the values.

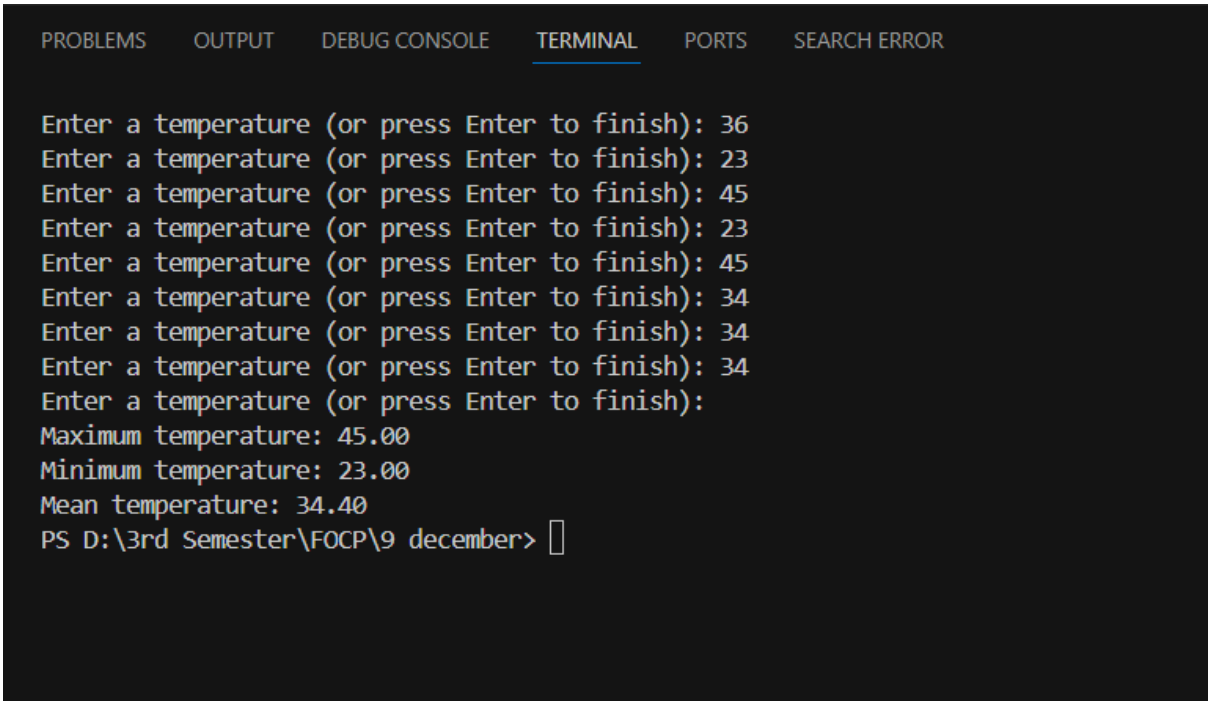
   Hint: You should know there are built-in functions for max and min. If you hunt, you might also find one for the mean.

```python
import statistics

def read_temperatures():
    """Read exactly 6 temperatures from the user."""
    temperatures = []
    print("Enter 6 temperatures:")
    for i in range(6):
        while True:
            user_input = input(f"Temperature {i + 1}: ")
            try:
                temp = float(user_input)
                temperatures.append(temp)
                break
            except ValueError:
                print("Invalid input. Please enter a numeric value.")

    return temperatures

def main():
    temperatures = read_temperatures()
    max_temp = max(temperatures)
    min_temp = min(temperatures)
    mean_temp = statistics.mean(temperatures)

    print("\nTemperature Summary:")
    print(f"Maximum temperature: {max_temp:.2f}")
    print(f"Minimum temperature: {min_temp:.2f}")
    print(f"Mean temperature: {mean_temp:.2f}")

if __name__ == "__main__":
    main()
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS  SEARCH ERROR

PS D:\3rd Semester\FOCP\9 december> python -u "d:\3rd Semester\FOCP\9 december\tempCodeRunnerFile.py"
Enter 6 temperatures:
Temperature 1: 23
Temperature 2: 24
Temperature 3: 67
Temperature 4: 56
Temperature 5: 45
Temperature 6: 34

Temperature Summary:
Maximum temperature: 67.00
Minimum temperature: 23.00
Mean temperature: 41.50
PS D:\3rd Semester\FOCP\9 december>
```

8. Modify the previous program so that it can process *any number* of values. The input terminates when the user just pressed "Enter" at the prompt rather than entering a value.

```python
import statistics

def read_temperatures():
    """Read temperatures from the user until an empty input is given."""
    temperatures = []
    while True:
        user_input = input("Enter a temperature (or press Enter to finish): ")
        if user_input == "":
            break
        try:
            temp = float(user_input)
            temperatures.append(temp)
        except ValueError:
            print("Invalid input. Please enter a numeric value.")

    return temperatures

def main():
    temperatures = read_temperatures()
    max_temp = max(temperatures)
    min_temp = min(temperatures)
    mean_temp = statistics.mean(temperatures)

    print(f"Maximum temperature: {max_temp:.2f}")
    print(f"Minimum temperature: {min_temp:.2f}")
    print(f"Mean temperature: {mean_temp:.2f}")

if __name__ == "__main__":
    main()
```


PROBLEMS
OUTPUT
DEBUG CONSOLE
TERMINAL
PORTS
SEARCH ERROR
Enter a temperature (or press Enter to finish): 36
Enter a temperature (or press Enter to finish): 23
Enter a temperature (or press Enter to finish): 45
Enter a temperature (or press Enter to finish): 23
Enter a temperature (or press Enter to finish): 45
Enter a temperature (or press Enter to finish): 34
Enter a temperature (or press Enter to finish): 34
Enter a temperature (or press Enter to finish): 34
Enter a temperature (or press Enter to finish):
Maximum temperature: 45.00
Minimum temperature: 23.00
Mean temperature: 34.40
PS D:\3rd Semester\FOCP\9 december>