CIS 125 Principles of Programming Logic
Homework #5: Input Validation and Arrays
100 points

1. Adding Maching with Input Validation

Create the following program named **hw5-1.py**:

a. Create a program that asks the user for a number - integer or float.
b. Create a **function that will verify it is a number (integer or float)**. If it is not, a loop will continue to ask the user for an integer or float number until they enter one.
c. After a valid number is entered:
    a. the number will be added to a running total (accumulator)
    b. And then the user will then be prompted if they want to add another number to this number/total (you can do this in the function or main – I did it in the main).
        i. The following are valid user inputs to this prompt: Y y Yes YES N n No NO
        ii. If the user does not enter a valid input, a loop will re-prompt them to do so until they enter a valid input. Use a Python as part of the input validation process.
        iii. If they inputs Y n Yes or YES, they will be prompted to enter another number, which will again be checked to ensure it is a number and not a string.
        iv. If they chose N n No or NO, the total (sum) of all numbers entered will be displayed.

Sample run of program:

```
Enter a number to add: 3
3 has been added to the total
Would you like to enter another number to add (Y or N)? HH
Invalid response. Please enter Y or N
Would you like to enter another number to add (Y or N)? y
Enter a number to add: 4.4
4.4 has been added to the total.
Would you like to enter another number to add (Y or N)? Y
Enter a number to add: ggggttT
This is not a number. Please re-enter
Enter a number to add: 2
2 has been added to the total
Would you like to enter another number to add (Y or N)? n
The sum of the numbers is:  9.4
```

2. **Adding Maching with Input Validation using a list and various List Methods, e.g. max, etc.**

Create a Python program named **hw5-2.py** that is a copy of your hw5-1.py file. Modify the program so that it stores each user inputted number into a list. After the user ends the user input of numbers output the following:

- Number (count) of numbers entered (in list)
- Smallest (min) of numbers entered (in list)
- Largest (max) of numbers entered (in list)
- Average of numbers entered (in list)
- Total (sum) of numbers entered (in list)

Sample run:

```
Enter a number to add:    5
5 has been added to the total

Would you like to enter another number to add (Y or N)? cat
Invalid response. Please enter Y or N
Would you like to enter another number to add (Y or N)? y
Enter a number to add:    10
10 has been added to the total

Would you like to enter another number to add (Y or N)? y
Enter a number to add:    meow
This is not a number. Please re-enter
Enter a number to add:    20
20 has been added to the total

Would you like to enter another number to add (Y or N)? n
Total numbers entered:                  3
Smallest number entered:                5.0
Largest number entered:                 20.0
The average of the numbers is:          11.7
The sum of the numbers is:              35.0
```

3. Simple array output (one dimensional array)

Create a Python program named **hw5-3.py** and create the following list (array) in it:

```
employees = ["Jim Bailey", "Amy Dillon", "Ali Nassar", "Jose Martinez", "Lenard Phillips"]
```

Then make your program do the following:

a) Output the list with this kind of for loop for name in
b) Output the list with this kind of for loop for i in range( )
(and do not use hard number for max value of loop – use a function to calculate it)
c) Output the list with this kind of for loop a while loop
d) Then, ask the user to enter a new employee as input
e) Add the new employee name (user input) to the array/list
f) Sort the list alphabetically
g) Use another loop (any type) to output the list/array.

Here is how the output should look (with sample user input before list 4):

```
List 1
-----------
Name:  Jim Bailey
Name:  Amy Dillon
Name:  Ali Nassar
Name:  Jose Martinez
Name:  Lenard Phillips
List 2
-----------
Name:  Jim Bailey
Name:  Amy Dillon
Name:  Ali Nassar
Name:  Jose Martinez
Name:  Lenard Phillips
List 3
-----------
Name:  Jim Bailey
Name:  Amy Dillon
Name:  Ali Nassar
Name:  Jose Martinez
Name:  Lenard Phillips

Enter a new employee: Frank Harper
List 4
-----------
Name:  Ali Nassar
Name:  Amy Dillon
Name:  Frank Harper
Name:  Jim Bailey
Name:  Jose Martinez
Name:  Lenard Phillips
```

4. Search a list

Create a new program named **hw5-4.py** and use the same list in it as you used in hw5-3.py.

- Then, ask for an employee name as user input (see output below).
- Output a message whether this name entered by the user is a valid name in the list.
- Use a loop that keeps asking for the employee name until a valid name from the list is entered. Do not use code that checks the list manually/one at a time.

Output:

Enter employee name: Harold Philips
Invalid employee name.
Enter employee name: Sam Johnson
Invalid employee name.
Enter employee name: Mohamed Bazzi
Valid employee name.

5. Multiple dimensional array (list of lists in Python)

Create a Python program named **hw5-5.py** and add this list of lists in it:

```
vehicles = []
vehicles.append(["2020","Chevy Silverado","Blue",3105])
vehicles.append(["2019","Ford Mustang","White",10302])
vehicles.append(["2018","Toyota RAV4","Gray",25132])
```

Then, create a for loop that produces this output below

- Use only one print statement
- Align output in columns as shown.
- Do not hard-code in any numbers for the number of times the loop should run. This value should be calculated using a built-in function.

Year: 2020	Make/Model: Chevy Silverado	Color: Blue	Miles: 3105
Year: 2019	Make/Model: Ford Mustang	Color: White	Miles: 10302
Year: 2018	Make/Model: Toyota RAV4	Color: Gray	Miles: 25132

6. Tuition Calculator with Input Validation

Make a copy of your earlier tuition calculator homework assignment program and name it hw5-6.py.

```
def calcTuition(credits1,credits2,type):
    if type == 1:
        tuition = (credits1 * 101.5) + (credits2 * 200) + ((credits1 + credits2) *
23)+50+60
    elif type == 2:
        tuition = (credits1 * 177) + (credits2 * 265) + ((credits1 + credits2) *
23)+50+60
    elif type == 3:
        tuition = (credits1 * 257) + (credits2 * 350) + ((credits1 + credits2) *
23)+50+60
    return tuition

print("1 - In District")
print("2 - Out of District Student")
print("3 - Out of State / International Student")
type = int(input("Choose one of the above (1-3):"))
credits1 = int(input("How many 100-200 level credits do you plan to register for?"))
credits2 = int(input("How many 300-400 level credits do you plan to register for?"))
tuition = calcTuition(credits1,credits2,type)
print ("Your tuition cost will be $%.2f" % tuition)
```

Change this program in the following ways:

- Only allow valid data types on all three (3) user inputs (menu choice, lower level credit hours and upper level credit hours).
- The program must not crash if alpha/letters input entered. For example, if letters (e.g. dog is entered as lower level credit hours) the program will not crash but will display an error message and re-ask user for valid input (same for other inputs).
- Only allow numeric values of 0-25 for lower level credit hours and upper level credit hours.
- Ask the user if they want to perform another calculation. If they indicate yes, a loop will allow the user to perform another calculation.
- Validate the user input for this to ensure a valid response is entered, i.e. “Y, y, Yes, yes, N, n, No, no” using a list. If an invalid response is entered, use a loop to re-ask the user for a valid response.

Sample output

1 - In District
2 - Out of District Student
3 - Out of State / International Student
Choose one of the above (1-3):5
Value must be between 1 and 3. Try again.
Choose one of the above (1-3): dog

Not an integer. Try again.
Choose one of the above (1-3):1
How many 100-200 level credits do you plan to register for (0-25)?3
How many 300-400 level credits do you plan to register for (0-25)?0
Your tuition cost will be $ 454

Would you like to calculate another tuition cost? (Y/N) dog
Invalid valid response. Would you like to calculate another tuition cost? (Y/N) y
1 - In District
2 - Out of District Student
3 - Out of State / International Student
Choose one of the above (1-3):2
How many 100-200 level credits do you plan to register for (0-25)? 99
Value must be between 0 and 25. Try again.
How many 100-200 level credits do you plan to register for (0-25)?: dog
Not an integer. Try again.
How many 100-200 level credits do you plan to register for (0-25)?:2
How many 300-400 level credits do you plan to register for (0-25)?0
Your tuition cost will be $ 479

Would you like to calculate another tuition cost? (Y/N) n