Question 1

Define a subprogram (user-defined function) that will **ask the user to enter a number** and save it as the variable 'num'.

Define another subprogram that will use 'num' and count from 1 to that number.

```
Enter a number: 5
1
2
3
4
5
```

Flowchart

| Start |

| enter_number() |

| num |

| count_to_number()|

| Display |

| Count |

| End |

Code with for Loop

```
def ask_value ():
    num = int(input('Enter a number: '))
    return num

def count (num):
    for i in range (1, num + 1):
        print (i)

num = ask_value ()
count (num)
```

Code with
while Loop

```
def ask_value ():
    num = int(input('Enter a number: '))
    return num

def count (num):
    n = 1
    while n <= num:
        print (n)
        n = n + 1

num = ask_value ()
count (num)
```

Question 2

Define a subprogram (user-defined function) that will ask the user to pick a low and a high number, and then generate a random number between those two values and store it in a variable called 'comp_num'.

Define another subprogram (user-defined function) that will give the instruction 'I am thinking of a number...' and then ask the user to guess the number they are thinking of.

Define a third subprogram (user-defined function) that **will check to see if the comp_num is the same as the user's guess.** If it is, it should display the message 'Correct, you win', otherwise it should keep looping, telling the user if they are too low or too high and asking them to guess again until they guess correctly.

```
= RESTART: C:/Users/warhlaingn/AppData
Enter the bottom of the range: 5
Enter the top of the range: 10
I am thinking of a number...
What am I thinking of: 7
Too low, try again: 4
Too low, try again: 6
Too low, try again: 8
Too low, try again: 9
CORRECT!! You Win.
```

Flowchart

| Start |

| enter_low_high() |

| generate_random |

| number() |

| prompt_guess() |

| check_guess() |

| End |

```
import random

def pick_num ():
    low = int (input ('Enter the bottom of the range: '))
    high = int (input ('Enter the top of the range: '))
    comp_num = random. randint (low, high)
    return comp_num

def first_guess ():
    print ('I am thinking of a number...')
    guess = int (input ('What am I thinking of: '))
    return guess

def check_answer (comp_num, guess):
    try_again = True
    while try_again == True:
        if comp_num == guess:
            print ('CORRECT!! You Win.')
            try_again = False
        elif comp_num > guess:
            guess = int (input ('Too low, try again: '))
        else:
            guess = int (input ('Too high, try again: '))

comp_num = pick_num ()
guess = first_guess ()
check_answer (comp_num, guess)
```

Question 3

3. Display the following menu to the user:
[1] Addition
[2] Subtraction
Enter 1 or 2:

If they enter a 1, it should run a subprogram (user-defined function) that will generate two random numbers between 5 and 20 and ask the user to add them together. Work out the correct answer and return both the user's answer and the correct answer.

If they entered 2 as their selection on the menu, it should run a subprogram (user-defined function) that will generate one number between 25 and 50 and another number between 1 and 25 and ask them to work out num1 minus num2.

This way they will not have to worry about negative answers. Return both the user's answer and the correct answer.

Create another subprogram (user-defined function) that will check if the user's answer matches the actual answer.

If it does, display 'Correct', otherwise display a message that will say 'Incorrect, the answer is' and display the real answer.

If they do not select a relevant option on the first menu you should display a suitable message.

Flowchart

Start

Import the random module

Define the addition function:

- Generate a random number between 5 and 20 and assign it to num1
- Generate a random number between 5 and 30 and assign it to num2
- **Print** the addition problem (num1 + num2)
- Prompt the user for an answer and store it in user_answer
- Calculate the actual answer and store it in actual_answer
- Create a list containing user_answer and actual_answer and return it

Define the subtraction function

- Same as above

```
import random

def addition ():
    num1 = random.randint(5, 20)
    num2 = random.randint(5, 30)
    print (num1, '+', num2, '=')
    user_answer = int (input('Your answer: '))
    actual_answer = num1 + num2
    answers = (user_answer, actual_answer)
    return answers

def subtraction ():
    num1 = random.randint(25, 50)
    num2 = random.randint(1, 25)
    print (num1, '-', num2, '=')
    user_answer = int (input('Your answer: '))
    actual_answer = num1 - num2
    answers = (user_answer, actual_answer)
    return answers
```

Flowchart

Define the check_answer function:

- Accept user_answer and actual_answer as parameters
- Check if user_answer equals actual_answer
  - If true, print 'Correct!'
  - If false, print 'WRONG! The answer is' followed by actual_answer

Print the menu options for addition and subtraction

Prompt the user to select an option and store it in selection

```
def check_answer (user_answer, actual_answer):
    if user_answer == actual_answer:
        print ('Correct!')
    else:
        print ('WRONG! The answer is', actual_answer)

print(' [1] Addition')
print(' [2] Subtraction')
selection = int(input('Enter 1 or 2: '))
```

Flowchart

If selection is 1:
- Call the addition function and unpack the returned tuple into user_answer and actual_answer
- Call the check_answer function with user_answer and actual_answer as arguments

Else if selection is 2:
- Call the subtraction function and unpack the returned tuple into user_answer and actual_answer
- Call the check_answer function with user_answer and actual_answer as arguments

Else:
- Print 'Incorrect selection.'

End

```
selection = int(input('Enter 1 or 2: '))
if selection == 1:
    user_answer, actual_answer = addition()
    check_answer(user_answer, actual_answer)
elif selection == 2:
    user_answer, actual_answer =  subtraction ()
    check_answer(user_answer, actual_answer)
else:
    print('Incorrect selection.')
```

```
import random

def addition ():
    num1 = random.randint(5, 20)
    num2 = random.randint(5, 30)
    print (num1, '+', num2, '=')
    user_answer = int (input('Your answer: '))
    actual_answer = num1 + num2
    answers = (user_answer, actual_answer)
    return answers

def subtraction ():
    num1 = random.randint(25, 50)
    num2 = random.randint(1, 25)
    print (num1, '-', num2, '=')
    user_answer = int (input('Your answer: '))
    actual_answer = num1 - num2
    answers = (user_answer, actual_answer)
    return answers
```

```
def check_answer (user_answer, actual_answer):
    if user_answer == actual_answer:
        print ('Correct!')
    else:
        print ('WRONG! The answer is', actual_answer)

print(' [1] Addition')
print(' [2] Subtraction')
selection = int(input('Enter 1 or 2: '))
if selection == 1:
    user_answer, actual_answer = addition()
    check_answer(user_answer, actual_answer)
elif selection == 2:
    user_answer, actual_answer =  subtraction ()
    check_answer(user_answer, actual_answer)
else:
    print('Incorrect selection.')
```

Question 4

4. Modify the Lab 6, Question 6 that will produce the following output using user-defined function:

A program to find the maximum and minimum numbers in a list.
Enter how many numbers you want to read into a list: 3
Enter a number: -100
Enter a number: 0
Enter a number: 100
Numbers in the list = [-100.0, 0.0, 100.0]
Maximum Number = 100.0
Minimum Number = -100.0
The program should consist of three (3) user-defined functions as follows:
The

```
def read_number(total_num_to_read):
    ...
    return user_list

def find_max_number(a_list_of_num):
    ...
    return max_num

def find_min_number(a_list_of_num):
    ...
    return min_num
```

The main program will consist of user-defined function callers and a set of return variables for storing the return arguments from a user-defined function.

In the end, the program will print the content of the list, the maximum number in the list, and the minimum number in the list.

Start

Flowchart

Define the read_number function:

- Accept total_num_to_read as a parameter
- Initialize an empty list called user_list
- Loop through a range from 0 to total_num_to_read - 1:
  - Prompt the user to enter a number and store it in list_num as a float
  - Append list_num to user_list
- Return user_list

```
def read_number(total_num_to_read):
    for i in range(total_num_to_read):
        list_num = float(input("Enter a number: "))
        user_list.append(list_num)
    return user_list
```

Define the find_max_number function:
- Accept a_list_of_num as a parameter
- Set max_num to the first element of a_list_of_num

- Loop through each list_num in a_list_of_num:
  - If list_num is greater than max_num:
    - Update max_num to be equal to list_num

- Return max_num

Define the find_min_number function:
- Accept a_list_of_num as a parameter
- Set min_num to the first element of a_list_of_num

- Loop through each list_num in a_list_of_num:
  - If list_num is less than min_num:
    - Update min_num to be equal to list_num

- Return min_num

Flowchart

```
def find_max_number(a_list_of_num):
    max_num = a_list_of_num[0]

    for list_num in a_list_of_num:
        if list_num > max_num:
            max_num = list_num
    return max_num

def find_min_number(a_list_of_num):
    min_num = a_list_of_num[0]

    for list_num in a_list_of_num:
        if list_num < min_num:
            min_num = list_num
    return min_num
```

Initialize an empty list called user_list
Print "A program to find the maximum and minimum numbers in a list."
Prompt the user to enter how many numbers they want to read and store it in total_list_num

Call the read_number function with total_list_num as an argument and store the result in return_list
Call the find_max_number function with return_list as an argument and store the result in max_num_in_list
Call the find_min_number function with return_list as an argument and store the result in min_num_in_list

Print "Numbers in the list =" followed by return_list
Print "Maximum Number =" followed by max_num_in_list
Print "Minimum Number =" followed by min_num_in_list

End

```
user_list = []
print ("A program to find the maximum and minimum numbers in a list.")
total_list_num = int(input("Enter how many numbers you want to read a list: "))

return_list = read_number(total_list_num)
max_num_in_list = find_max_number (return_list)
min_num_in_list = find_min_number(return_list)

print("Numbers in the list =", return_list)
print("Maximum Number =", max_num_in_list)
print("Minimum Number =", min_num_in_list)
```

Flowchart