IDC101-Introduction to computers (Python programming)

Lab tasks – **Session 08**   January 09-10 2023

- Name your Colab sheet as rollNo-WS-No.ipynb (for example, if you are making colab sheet for WS8 then it should be named as: rollNo-WS-08.ipynb)

Learn to use:
- Learn to define and use data types **tuple**, **set, and dict**

```
a=10
extup=(2,3,4,a)
print(extup)
a=15
print(extup) ## Changing the value of a does not change it in
             ##  tuple as it is already created with values.
```

```
Set
x={2,3,4,4}
print(x)
```
Note: The elements of the set are immutable in nature. So, Set cannot be constructed for a data type, which can be modified such as list, dict, and set itself. The following will give error:
```
    a=[10,20]
    b=[3,4]
    c={a,b}
    print(c) ## RETUTNS TypeError (Same would be case if a,
or b is a dict).
```
Dict
```
Practice dict() data type. For example, put the following data
in dict()
Rollno->[Last Name, first name and courses],courses-
>subjects[marks]…
Data:
```

Roll no	Last name	First name	Subjects	marks
19292	Tim	Piotr	Maths	90
19292	Tim	Piotr	Science	80

```
data=dict()
data[19292]=dict(lastName='Skolnick',firstName='Piotr',subjects
=dict(maths=90,science=90))
print(data[19292]['subjects']['maths']) ## Prints maths marks
```

Finish all previous python Lab tasks

Q 1. Store collatz sequence for numbers 27, 51, and 67. Find the common set of numbers in their collatz sequences. Also find unique numbers in collatz sequence for each one of them.

Q 2. Store vectors as tuple. Write a function to perform dot product between two three-dimension (3d) vectors. Find length of a vector as square root of dot

product vector itself. The square root of a number can be calculated using function present in module named as <u>math</u>. You need to import the module before you can use the function. Use the following syntax to import math module

```
import math
X=25
math.sqrt(X) ## calculate square root of X

The dot product is given by:
V=(vₓ,v_y,v_z), A=(aₓ,a_y,a_z)
V.A or (V dot A) = (vₓ*aₓ)+ (v_y*a_y)+ (v_z*a_z)
```

Q 3. In continuation with previous question, write a function to find angle between any two (3d) vectors. The angle between vectors is given as:

```
V1=(V1x,V1y,V1z)
V2=(V1x,V1y,V1z)

angle(V1,V2) = cos⁻¹(V1.V2/(|V1|.|V2|))
```

Note: Trigonometric functions are present in Math modules. The cos/sin/tan takes inputs in **Radians.** Similarly, inverse functions (acos/asin/atan) returns result in **radians**. You will have to write a function to convert degrees to radians (vice-versa) using the relation:

PI (22/7) radians = 180 degrees

Q 4. Store the below given data in **dict** data type. Compute subject average of a class and also average marks of a student.

Roll number	Subject	Score
51201	Maths	80
51201	Science	90
51201	Hindi	78
51201	English	76
51202	Maths	82
51202	Science	88
51202	Hindi	80
51202	English	82