PRG1

WEEK 14

NGEE ANN
SCHOOL OF INFOCOMM TECHNOLOGY

More on Nested Loops & Functions

Programming I (PRG1)

Diploma in Information Technology

Diploma in Financial Informatics

Diploma in Cybersecurity & Digital Forensics

Common ICT Programme

Year 1 (2019/20), Semester 1

Activity 1: Trigonometry

- **Write code to print the following table to display the sin value and cos value of angles from 0 to 360 degrees with increments of 10 degrees. Corresponding radian values are shown. Round the results to keep four digits after the decimal point.**

Degree	Radians	Sin	Cos
0	0.00	0.0000	1.0000
10	0.17	0.1736	0.9848
20	0.35	0.3420	0.9397
30	0.52	0.5000	0.8660
…			
…			
350	6.11	-0.1736	0.9848
360	6.28	0.0000	1.0000

Activity 2: Great Circle Distance

- The great circle distance is the distance between two points on the surface of a sphere. Let (x1, y1) and (x2, y2) be the geographical latitude and longitude of two points. The great circle distance tween the two points can be computed as follows:

```
d = radius * arcos(sin(x1) * sin(x2) + cos(x1) * cos(x2) *
cos(y1 – y2))
```

- Write a program that prompts the user for the latitude and longitude of two points on the earth in degrees and displays its great circle distance. The average earth radius is 6.371.01km. The latitude and longitude degrees in the formula are for North and West. Use negative to indicate south and East degrees.

Activity 2: Great Circle Distance

- **Here is output of a sample run:**

```
Enter  point 1(latitude and longitude) in degrees: 39.55 -116.25
Enter  point 2(latitude and longitude) in degrees: 41.5 87.37
The distance between the two points is 10691.7918 km.
```

Activity 3: Calculate Area of Triangle

Recall this question in Week 4 Lecture (Part 2) Activity 3

- Given the length of all three sides of a triangle, a, b, c, the area of the triangle can be computed by using Heron's formula:

  $$area = \sqrt{s(s-a)(s-b)(s-c)} \quad where\ s = \frac{a+b+c}{2}$$

- Write a program to input the values of three sides. Calculate and display the area if the input values can form a triangle. Display an error message if the values are not able to form a triangle.

- Now write a function is_valid() that receives true if sum of two sides is greater than third side.
- Write a function find_area() that returns the area of that triangle.

Activity 3: Calculate Area of Triangle

Sample run:

```
Enter length of Side A: 20
Enter length of Side B: 5
Enter length of Side C: 20
Input lengths can form a triangle of area 49.61 square units
>>> ================================ RESTART ================
>>>
Enter length of Side A: 20
Enter length of Side B: 5
Enter length of Side C: 12
Input lengths cannot form a triangle.
```

Activity 4 : Module Processing

- You are to write a Python program to help the school to calculate the statistics for results of a module taken by 3 classes of students.
- The following lists were created to store the information about the classes and marks for each of the classes for the module.

```
p01 = [86, 80, 75, 82, 80, 70]
p02 = [40, 55, 60, 48, 50]
p03 = [90, 85, 30, 86, 78, 75, 54]

marks_list = [p01, p02, p03]
```

Activity 4 : Module Processing

- **Here is a sample run of the program:**

```
Class       Average
P01         78.83
P02         50.60
P03         71.14
The overall average mark is 68.00
The highest mark is 90
The lowest mark is 30
```

Activity 5 : Employee Weekly Hours

- The following shows the information about employees in a company and the number of hours that each of them worked weekly.

	Su	M	T	W	Th	F	Sa
Jenny	2	4	3	4	5	8	8
Luke	7	3	4	3	3	4	4
Mike	3	3	4	3	3	2	2
Joanne	9	3	4	7	3	4	1
Tom	3	5	4	3	6	3	8

- The information is represented in the following lists:

```
employee_list = ['Jenny', 'Luke', 'Mike','Joanne', 'Tom']
```

Activity 5 : Employee Weekly Hours

```
hrs_list = [[2, 4, 3, 4, 5, 8, 8],\
            [7, 3, 4, 3, 3, 4, 4],\
            [3, 3, 4, 3, 3, 2, 2],\
            [9, 3, 4, 7, 3, 4, 1],\
            [3, 5, 4, 3, 6, 3, 8]]
```

- You are to write a Python program that helps the company to enquire some statistics and to edit information as follows:
  - To display the working hours for the week for all employees.
  - To display the total working hours and salary for each of the employee in the week
  - To display the total working hours per day of the week
  - To allow user to edit working hours of an employee for one of the days.

Activity 5 : Employee Weekly Hours

- **A sample run is as follows:**

```
Work Hours Processing
---------------------

[1] Working Hrs in the week
[2] Total Hrs and Salary by Employee
[3] Total Hrs by Day
[4] Edit Working Hrs
[5] Exit
Enter option: 1
Working Hrs in the week

          Su    M     T     W     Th    F     Sa
Jenny     2     4     3     4     5     8     8
Luke      7     3     4     3     3     4     4
Mike      3     3     4     3     3     2     2
Joanne    9     3     4     7     3     4     1
Tom       3     5     4     3     6     3     8
```

Activity 5 : Employee Weekly Hours

```
Work Hours Processing
---------------------

[1] Working Hrs in the week
[2] Total Hrs and Salary by Employee
[3] Total Hrs by Day
[4] Edit Working Hrs
[5] Exit
Enter option: 2
Total Hrs and Salary by Employee

Employee Name  Total Hrs in Week   Total Salary($)
Jenny          34                  170
Luke           28                  140
Mike           20                  100
Joanne         31                  155
Tom            32                  160

Total Hrs worked:  145
Total Salary to be paid($):  725
```

Activity 5 : Employee Weekly Hours

```
Work Hours Processing
---------------------

[1] Working Hrs in the week
[2] Total Hrs and Salary by Employee
[3] Total Hrs by Day
[4] Edit Working Hrs
[5] Exit
Enter option: 3
Total Hrs by Day

Su    M     T     W     Th    F     Sa
24    18    19    20    20    21    23

Total Hrs worked:  145
Total Salary to be paid($):  725
```

Activity 5 : Employee Weekly Hours

```
Work Hours Processing
---------------------

[1] Working Hrs in the week
[2] Total Hrs and Salary by Employee
[3] Total Hrs by Day
[4] Edit Working Hrs
[5] Exit
Enter option: 4
Edit Working Hrs

          Su   M    T    W    Th   F    Sa
Jenny     2    4    3    4    5    8    8
Luke      7    3    4    3    3    4    4
Mike      3    3    4    3    3    2    2
Joanne    9    3    4    7    3    4    1
Tom       3    5    4    3    6    3    8

Please enter the employee name to edit: Mike
Please enter the day to edit: Th
Please enter the new working hours: 8

Edit completed
```

Activity 5 : Employee Weekly Hours

```
Work Hours Processing
---------------------

[1] Working Hrs in the week
[2] Total Hrs and Salary by Employee
[3] Total Hrs by Day
[4] Edit Working Hrs
[5] Exit
Enter option: 1
Working Hrs in the week

          Su    M     T     W     Th    F     Sa
Jenny     2     4     3     4     5     8     8
Luke      7     3     4     3     3     4     4
Mike      3     3     4     3     8     2     2
Joanne    9     3     4     7     3     4     1
Tom       3     5     4     3     6     3     8
```