Practices make your coding skill perfect. So, whenever you are given an exercise, please try and practice it.

Remember that computer coding skills need a systematic approach.

Therefore, every week's learning is built on the current week and previous week learning.

Lab08 Modules

Q1: Generate 10 random lottery tickets and randomly select two tickets from it as a winner

```
import random
lottery_tickets = []
print("creating 10 random lottery tickets")
for i in range(10):
    # ticket number must be 10 digit (100000, 999999)
    lottery_tickets.append(random.randrange(100000, 999999))
# select 2 luck tickets
select = random.sample(lottery_tickets, 2)
print("Lucky 2 lottery tickets are", select)
```

- **Modify the code to generate 20 tickets**
- **Pick one only.**
- **Change list [] into dic {i: ticket_number}**

Q2: Generate 4 random integers between 10 and 100 which is divisible by 10

```
import random
print("Generating 4 random integer number between 10 and 100 divisible by 10")
for i in range(4):
    print(random.randrange(10, 100, 10), end=', ')
```

- **Change the range into 50 and 100 divisible by 5**
- **Generate 10 random integers**

Q3: Select a random character from a given String

```
import random
st = 'CSE5APGSEM22020'
ch = random.choice(st)
print("The random char is ", ch)
```

- **Use for-loop to get 4 different chars**
- **Use if (or while) condition to remove duplication: a char can not be selected more than one times**

Q4: Select 2 random character from a given String

```
import random
st = 'CSE5APGSEM22020'
char = random.choices(st,k=2)
print("random char is ", char)
```

- **Select 3 random characters.**
- **Use for loop to select 3 random characters 4 times.**
- **Use if (or while) condition to remove duplication: each 3 of chars cannot be selected more than one time.**

Q5: Generate random String of length 10

```
import random
import string
def randString(stLength):
    """Generate a random string"""
    letters = string.ascii_letters
    return ''.join(random.choice(letters) for i in range(stLength))

print ("The Random String is ", randString(10) )
```

- **Generate a random string of length 15**
- **Write a function to Print each string character in a different line**

Q6: Calculate multiplication of two random float numbers

```
import random
num1  = random.random()
print("First Random float is ", num1)
num2 = random.uniform(9.5, 99.5)
print("Second Random float is ", num1)
num3 = num1 * num2
print("Multiplication is ", num3)
```

- **Write a function to Calculate the multiplication of 4 random float numbers**
- **Write a function to Calculate the multiplication of 4 random integer numbers**

Q7: The following code will generate the same random number every time you call it

```
import random

l = [1, 2, 3, 4, 5, 6, 7, 8, 9]
print("Randomly selecting same number")
for i in range(6):
    random.seed(25)
    print(random.choice(l))
```

- **Modify the code to generate different numbers**
- **Use a loop to generate diverse numbers**

Q8: The following code calculates the drop time of object released from a height h, in a gravitational field of strength g, with initial vertical speed v

```
from math import sqrt
def drop_time(height, speed, gravity):
    return (speed + sqrt(speed**2 + 2.0*height*gravity)) / gravity
x=drop_time(5,6,7)
print (x)
```

- **Write a function that computes the area of a triangle with edge lengths a, b, c:**

$$A = \sqrt{s(s-a)(s-b)(s-c)}, \qquad s = \frac{a+b+c}{2}.$$

Q9:

```
import math
print ("sin(4) : ",  math.sin(4))
print ("sin(-4) : ",  math.sin(-4))
print ("sin(0) : ",  math.sin(0))
print ("sin(math.pi) : ",  math.sin(math.pi))
print ("sin(math.pi/2) : ",  math.sin(math.pi/2))
```

- **Change the above code to calculate cos.**

Q10: Convert sine to degree

```
from math import sin, radians
sine30 = sin(radians(30))
sine45 = sin(radians(45))
sine60 = sin(radians(60))
print ("The sine of 30 in degree is ", sine30)
print ("The sine of 45 in degree is ", sine45)
print ("The sine of 60 in degree is ", sine60)
```

- **Change the above code to calculate cos in degree.**

Q11:

```
import time
print(time.asctime())
# Wed Sep 23 07:17:09 2020
```

- **Run the above code using for-loop and check the printed time.**

Q12:

```
>>> import math
>>> dir(math)
['__doc__', '__loader__', '__name__', '__package__', '__spec__',
'acos', 'acosh', 'asin',
'asinh', 'atan', 'atan2', 'atanh', 'ceil', 'copysign', 'cos', 'cosh',
'degrees', 'e', 'erf',
'erfc', 'exp', 'expm1', 'fabs', 'factorial', 'floor', 'fmod', 'frexp',
'fsum', 'gamma',
'gcd', 'hypot', 'inf', 'isclose', 'isfinite', 'isinf', 'isnan',
'ldexp', 'lgamma', 'log',
'log10', 'log1p', 'log2', 'modf', 'nan', 'pi', 'pow', 'radians', 'sin',
'sinh', 'sqrt',
'tan', 'tanh', 'trunc']

# random
>>> import random
>>> dir(random)
['BPF', 'LOG4', 'NV_MAGICCONST', 'RECIP_BPF', 'Random',
'SG_MAGICCONST', 'SystemRandom',
'TWOPI', '_BuiltinMethodType', '_MethodType', '_Sequence', '_Set',
'__all__', '__builtins__',
'__cached__', '__doc__', '__file__', '__loader__', '__name__',
'__package__', '__spec__',
'_acos', '_ceil', '_cos', '_e', '_exp', '_inst', '_log', '_pi',
'_random', '_sha512', '_sin',
'_sqrt', '_test', '_test_generator', '_urandom', '_warn',
'betavariate', 'choice', 'expovariate',
'gammavariate', 'gauss', 'getrandbits', 'getstate', 'lognormvariate',
'normalvariate',
```

```
'paretovariate', 'randint', 'random', 'randrange', 'sample', 'seed',
'setstate', 'shuffle',
'triangular', 'uniform', 'vonmisesvariate', 'weibullvariate']

>>> help(random.choice)

 >>> Help on method choice in module random:
choice(seq) method of random.Random instance
    Choose a random element from a non-empty sequence.
```

- **Run the above code for different modules.**
- **Run help(random.choices)**

Q13: Generate a random Password that meets the following conditions the length must be 10 characters long; It must contain at least 2 upper case letters, 1 digit, and 1 special symbol.

```
import random
import string
def randomPassword():
    randomSource = string.ascii_letters + string.digits +
string.punctuation
    password = random.sample(randomSource, 6)
    password += random.sample(string.ascii_uppercase, 2)
    password += random.choice(string.digits)
    password += random.choice(string.punctuation)

    passwordList = list(password)
    random.SystemRandom().shuffle(passwordList)
    password = ''.join(passwordList)
    return password

print ("Password is ", randomPassword())
```

- **Change Password length in 12 characters: 2 digits and 2 special symbols**
- **Use dic {name: Password} to save the Password of 5 users**

Lab08 Numpy Lib

Q16

- **Install NumPy**
- **Import NumPy as np**
- **Create a 1D and 2D Boolean array**
- **Create a 1D array [1 to 20]. Extract items that satisfy a given condition: item %== 1**
- **Create a 1D array [1 to 20]. Replace items that satisfy a condition item %== 1 with -1.**
- **Convert a 1D array to a 2D array with 2 rows: [0, 1, 2, 3, 4, 5, 6, 7, 8, 9] convert to [0, 1, 2, 3, 4],[5, 6, 7, 8, 9]**
-

- **swap 1 and 2 rows in a 2d (3X3) NumPy array [1 to 10].**

- **Create a 2D (3X3) array containing random floats between 5 and 10.**