CS 125 – 1 September 2020

Demonstration 1: turtle random walk

```
import turtle
import random

w = turtle.Screen()
ted = turtle.Turtle()

# random turtle walk
# move a turtle in a random direction ten times
steps = random.randrange(10,50)
print("steps:",steps)
for i in range(steps):
    # random color
    red = random.random() # random decimal number between 0 and 1
    green = random.random()
    blue = random.random()
    print("red:",red,"; green:",green,"; blue:",blue)
    ted.color(red, green, blue)

    speed = random.randrange(1,10)
    ted.speed(speed)
    angle = random.randrange(0,360)  # random number {0,1,2,..,359}
    ted.left(angle)
    dist = random.randrange(10,100) # random number {10,11,12,..,99}
    ted.forward(dist)
```

Demonstration 2: the accumulator pattern

```
# accumulator pattern
# add up the numbers 1+2+3+...+20

runningSum = 0 # accumulator

# loop
for i in range(1, 21):   # i takes on values 1, 2, ... 20
    runningSum = runningSum + i**2  # add runningSum + i, and store result
in runningSum
    print(i, runningSum)

print("total:",runningSum)
```

Solutions to Practice with Python Modules

1. Hexagon with random side length

```
import turtle
import random
import math

wn = turtle.Screen()
ted = turtle.Turtle()

n = random.randrange(20,200)
for _ in range(6):
    ted.forward(n)
    ted.left(60)
```

2. Sum of three random numbers

```
import random
s = 0
for _ in range(3):
    n = random.random()
    print(n)
    s += n
print("sum:",s)
```

3. Circumference and area of a circle

```
import math
r = float(input("What is the radius?"))
circ = 2*math.pi*r
area = math.pi*r*r
print("The circumference is",circ)
print("The area is",area)
```

4. Area of a triangle

```
import math
x1 = float(input(("Enter the x-coordinate of point 1:")))
y1 = float(input(("Enter the y-coordinate of point 1:")))
x2 = float(input(("Enter the x-coordinate of point 2:")))
y2 = float(input(("Enter the y-coordinate of point 2:")))
x3 = float(input(("Enter the x-coordinate of point 3:")))
y3 = float(input(("Enter the y-coordinate of point 3:")))

a = math.sqrt( (x2-x1)**2 + (y2-y1)**2 )
b = math.sqrt( (x3-x1)**2 + (y3-y1)**2 )
c = math.sqrt( (x3-x2)**2 + (y3-y2)**2 )
s = (a+b+c)/2
```

```
area = math.sqrt(s*(s-a)*(s-b)*(s-c))
print("Area:",area)
```

5. Simulate ten rolls of a die

```
import random
s = 0
for _ in range(10):
    s += random.randrange(1,7)
print("sum:",s)
```

6. Approximate pi

```
n = int(input("How many terms?"))
p = 3
for i in range(2,n+1):
    p += (-1)**i * 4/((2*i)*(2*i-1)*(2*i-2))
print("Approximation:",p)
```