

# Homework #4

*Due: April 26, 2023, Wednesday, 23:59.*

## **While Loops: *Collecting Acorns from Trees***

### Orientation: Random number generators and their seeds

A **random number generator** produces a random number each time it is called. On the first call, the number is generated by feeding the present system time value into a complex formula. On subsequent calls, the last generated random number is used to obtain the next random number.

In some applications, we need to have the same **sequence of random numbers**. For this end, instead of using the present system time as the starting value, we use a value that we choose. This starting value is called the **seed**. Each time you initialize the random number generator seed to a specific value, the following sequence of generated random numbers are always the same.

#### ***Example script 1:***

```
import random
random.seed(0)
for k in range(10):
    print(random.randint(1,10),end=' ')
```

#### ***Its output (always the same):***

```
7 7 1 5 9 8 7 5 8 6
```

#### ***Example script 2:***

```
import random
random.seed(200)
for k in range(10):
    print(random.randint(1,10),end=' ')
```

#### ***Its output (always the same):***

```
1 4 1 3 10 5 1 8 3 1
```

Until now, we have been using user input for the few input we needed for our programs. In this homework, we will need a lot of numbers; so we will use the user input as a **seed** for the random number sequence we need.



### Hazel's problem of collecting acorns

Scrat's great great granddaughter, Hazel, is a squirrel that lives in a park and regularly collects acorns (oak nuts) for her family. This little park has five oak trees. Each of these trees has four acorns every day. Some of those are good acorns; some have gone bad (rotten). Hazel only collects the good ones.

Hazel wants to collect 10 acorns per day. However, sometimes she has to go home with less. This happens when:

- There are less than 10 good acorns on the five oak trees; or
- After collecting five good acorns, she encounters four consecutive bad ones and gives up.

Your goal is to write a Python program that simulates Hazel's acorn collection:

1. Get that day's random seed from the user. Initialize the random number generator with this seed. Your program should then evaluate that day's acorn collection pattern.
2. To determine if an acorn is good or bad, use a random number generator that generates either 0 or 1. Take 0 as bad, 1 as good.
3. For each acorn Hazel encounters, indicate whether it is good or bad. For bad acorns, also add its sequence number in this streak of consecutive bad acorns.
4. When Hazel finishes processing a tree, give a summary of collected and rejected (rotten) acorns so far.
5. When Hazel decides to go home, give information on how many trees were visited and how many acorns were collected.
6. Get the next day's seed from the user. If the seed is zero, stop. Otherwise repeat the same process.

***Sample output:***

```
Enter seed or 0 to stop: 344

Encountered a good acorn!
Encountered a good acorn!
Encountered a bad acorn! Consecutive bad acorns: 1
Encountered a good acorn!
Trees finished: 1    Collected acorns: 3    Rotten acorns: 1
Encountered a good acorn!
Encountered a good acorn!
Encountered a good acorn!
Encountered a good acorn!
Trees finished: 2    Collected acorns: 7    Rotten acorns: 1
Encountered a good acorn!
Encountered a good acorn!
Encountered a good acorn!
Going home for today. Trees visited: 3    Acorns collected: 10

Enter seed or 0 to stop: 3

Encountered a bad acorn! Consecutive bad acorns: 1
Encountered a bad acorn! Consecutive bad acorns: 2
Encountered a good acorn!
Encountered a good acorn!
Trees finished: 1    Collected acorns: 2    Rotten acorns: 2
Encountered a bad acorn! Consecutive bad acorns: 1
Encountered a bad acorn! Consecutive bad acorns: 2
Encountered a good acorn!
Encountered a good acorn!
Trees finished: 2    Collected acorns: 4    Rotten acorns: 4
Encountered a bad acorn! Consecutive bad acorns: 1
Encountered a bad acorn! Consecutive bad acorns: 2
Encountered a good acorn!
Encountered a good acorn!
Trees finished: 3    Collected acorns: 6    Rotten acorns: 6
Encountered a good acorn!
Encountered a bad acorn! Consecutive bad acorns: 1
Encountered a bad acorn! Consecutive bad acorns: 2
Encountered a bad acorn! Consecutive bad acorns: 3
Trees finished: 4    Collected acorns: 7    Rotten acorns: 9
Encountered a good acorn!
Encountered a bad acorn! Consecutive bad acorns: 1
Encountered a bad acorn! Consecutive bad acorns: 2
Encountered a bad acorn! Consecutive bad acorns: 3
Trees finished: 5    Collected acorns: 8    Rotten acorns: 12
Going home for today. Trees visited: 5    Acorns collected: 8
```

Enter seed or 0 to stop: 4

Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a good acorn!  
Trees finished: 1    Collected acorns: 2    Rotten acorns: 2  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a bad acorn! Consecutive bad acorns: 2  
Encountered a bad acorn! Consecutive bad acorns: 3  
Trees finished: 2    Collected acorns: 3    Rotten acorns: 5  
Encountered a bad acorn! Consecutive bad acorns: 4  
Encountered a good acorn!  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Trees finished: 3    Collected acorns: 5    Rotten acorns: 7  
Encountered a bad acorn! Consecutive bad acorns: 2  
Encountered a good acorn!  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Trees finished: 4    Collected acorns: 7    Rotten acorns: 9  
Encountered a bad acorn! Consecutive bad acorns: 2  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a bad acorn! Consecutive bad acorns: 2  
Trees finished: 5    Collected acorns: 8    Rotten acorns: 12  
Going home for today. Trees visited: 5    Acorns collected: 8

Enter seed or 0 to stop: 5

Encountered a good acorn!  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a good acorn!  
Trees finished: 1    Collected acorns: 3    Rotten acorns: 1  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a bad acorn! Consecutive bad acorns: 2  
Encountered a bad acorn! Consecutive bad acorns: 3  
Encountered a bad acorn! Consecutive bad acorns: 4  
Trees finished: 2    Collected acorns: 3    Rotten acorns: 5  
Encountered a good acorn!  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a good acorn!  
Trees finished: 3    Collected acorns: 6    Rotten acorns: 6  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a bad acorn! Consecutive bad acorns: 2  
Encountered a bad acorn! Consecutive bad acorns: 3  
Encountered a bad acorn! Consecutive bad acorns: 4  
Trees finished: 4    Collected acorns: 6    Rotten acorns: 10  
Going home for today. Trees visited: 4    Acorns collected: 6

Enter seed or 0 to stop: **13**

Encountered a good acorn!  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a bad acorn! Consecutive bad acorns: 2  
Trees finished: 1    Collected acorns: 2    Rotten acorns: 2  
Encountered a bad acorn! Consecutive bad acorns: 3  
Encountered a bad acorn! Consecutive bad acorns: 4  
Encountered a bad acorn! Consecutive bad acorns: 5  
Encountered a bad acorn! Consecutive bad acorns: 6  
Trees finished: 2    Collected acorns: 2    Rotten acorns: 6  
Encountered a bad acorn! Consecutive bad acorns: 7  
Encountered a bad acorn! Consecutive bad acorns: 8  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Trees finished: 3    Collected acorns: 3    Rotten acorns: 9  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a bad acorn! Consecutive bad acorns: 2  
Encountered a good acorn!  
Trees finished: 4    Collected acorns: 5    Rotten acorns: 11  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a bad acorn! Consecutive bad acorns: 2  
Encountered a good acorn!  
Encountered a good acorn!  
Trees finished: 5    Collected acorns: 7    Rotten acorns: 13  
Going home for today. Trees visited: 5    Acorns collected: 7

Enter seed or 0 to stop: **21**

Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a good acorn!  
Encountered a good acorn!  
Encountered a good acorn!  
Trees finished: 1    Collected acorns: 3    Rotten acorns: 1  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Encountered a good acorn!  
Encountered a bad acorn! Consecutive bad acorns: 1  
Trees finished: 2    Collected acorns: 5    Rotten acorns: 3  
Encountered a bad acorn! Consecutive bad acorns: 2  
Encountered a bad acorn! Consecutive bad acorns: 3  
Encountered a bad acorn! Consecutive bad acorns: 4  
Going home for today. Trees visited: 3    Acorns collected: 5

```
Enter seed or 0 to stop: 28

Encountered a bad acorn! Consecutive bad acorns: 1
Encountered a bad acorn! Consecutive bad acorns: 2
Encountered a bad acorn! Consecutive bad acorns: 3
Encountered a bad acorn! Consecutive bad acorns: 4
Trees finished: 1    Collected acorns: 0    Rotten acorns: 4
Encountered a bad acorn! Consecutive bad acorns: 5
Encountered a good acorn!
Encountered a good acorn!
Encountered a bad acorn! Consecutive bad acorns: 1
Trees finished: 2    Collected acorns: 2    Rotten acorns: 6
Encountered a bad acorn! Consecutive bad acorns: 2
Encountered a bad acorn! Consecutive bad acorns: 3
Encountered a good acorn!
Encountered a bad acorn! Consecutive bad acorns: 1
Trees finished: 3    Collected acorns: 3    Rotten acorns: 9
Encountered a bad acorn! Consecutive bad acorns: 2
Encountered a bad acorn! Consecutive bad acorns: 3
Encountered a bad acorn! Consecutive bad acorns: 4
Encountered a bad acorn! Consecutive bad acorns: 5
Trees finished: 4    Collected acorns: 3    Rotten acorns: 13
Encountered a good acorn!
Encountered a bad acorn! Consecutive bad acorns: 1
Encountered a bad acorn! Consecutive bad acorns: 2
Encountered a bad acorn! Consecutive bad acorns: 3
Trees finished: 5    Collected acorns: 4    Rotten acorns: 16
Going home for today. Trees visited: 5    Acorns collected: 4

Enter seed or 0 to stop: 0
```

Save your program as **hw04yoursurname\_yourname.py**. Upload your file to Blackboard at “Homework 4”.

Make sure you place comments in your program. Place your name, ID as comments at the top.

**You should only use the features and commands you have learnt until this homework was given. You are not allowed to use `BREAK`, `CONTINUE`, `RETURN`, `QUIT`, `EXIT` or any other statement that prematurely stops your loop or your program.**

*While doing all your homework assignments, remember that:*

- *You should not work together,*
- *You should not give or take any files,*
- *You should not give or take help other than simple verbal hints.*