COMP6010 Practical Week 5

1. How many times the statement will be executed in each of the following cases

```
a)
i = 1
while (i < 100):
  statement
  i += 1
# 99 times

b)
i = 1
 while (i < 100):
    statement
    if (i >=50)
      break;
    i += 1
# 50 times


c)
i = 1
 while (i < 100):
    statement
    if (i >=50)
      continue;
    i += 1
# infinite number of times; need to avoid such pitfall
# when i becomes 50, its value remains unchanged; loop
condition is always true


d)
for i in range(1,11):
  for j in range(1, 11):
    statement
# 100 times

e)
for i in range(1, 11):
 for j in range(1, i+1):
   statement
# 55 times
# when i = 1, j = 1
# when i = 2, j = 1, 2
# when i = 3, j = 1, 2, 3
# …
# when i = 10, j = 1,2,3, …, 10
```

2. The Syracuse sequence is defined as follows.
Take any positive number n and apply the following rules:

If n is even do n = n/2
If n is odd >1 do n = 3n+1
If n = 1 then stop (this is to avoid to have the cycle 1, 4, 2, 1…)

It is conjectured (this means that we do not have a proof of this fact only strong evidences) that iterating this process will always end with n = 1.
In fact all the integers n less than or equal to 3*2^53 always reach 1.
Write a program to display the Syracuse sequence for any positive number n and the length of this sequence.

For example, 3 gives the sequence 3, 10, 5, 16, 8, 4, 2, 1 which is of length 8.

ANSWER:

```
length = 1
number = input("Enter a positive number: ")
number = int(number)
print(number)
while (number != 1):
  if number%2 == 0:
    number = number//2
  else:
    if number>1:
      number = 3*number + 1
  length += 1
  print(number)
print("length = " +str(length))
```

3. Write a program to compute the nth term of the sequence defined by

$U_{n+3}=U_{n+2}+ 2U_{n+1}- U_n$
with arbitrary values for U_1, U_2 and U_3.

ANSWER:

```
counter = 4
previous1 = int(input("Enter u1: "))
previous2 = int(input("Enter u2: "))
previous3 = int(input("Enter u3: "))
n = int(input("Enter n: "))
while (counter <= n):
  current = -1*previous1 + 2*previous2 + previous3
  previous1 = previous2
  previous2 = previous3
  previous3 = current
```

```
  print(str(current))
  counter += 1
```