

# Programming and Scripting

## Lab 4.2 loops

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### Introduction.

In this lab we look at while loops and for loops

### While

1. Write a program (evens.py) that uses a while loop to print all the even numbers from 2 to 100.

```
# Prints out all the even numbers from 2 to 100
# Author: Andrew Beatty

numberTo = 100
evenNum = 2

while evenNum <= numberTo:
    print (evenNum)
    evenNum += 2
```

2. Write a program (guess1.py) that prompts the user to guess a number, the program should keep prompting the user to guess the number until the user gets the right on

```
Please guess the number:2
Wrong
Please guess again:5
Wrong
Please guess again:30
Well done! Yes the number was 30
```

Answer

```
numberToGuess = 30

guess = int(input("Please guess the number:"))
while guess != numberToGuess:
    print ("Wrong")
    guess = int(input("Please guess again:"))

print ("Well done! Yes the number was ", numberToGuess)
```

3. How would you modify the program in 3 (guess2.py) above, so that the program tells the user if their guess is too high or too low, each time they guess. HINT: put an if statement inside the while loop

```
Please guess the number:22
too low
Please guess again:55
too high
Please guess again:30
Well done! Yes the number was 30
```

```
numberToGuess = 30

guess = int(input("Please guess the number:"))
while guess != numberToGuess:
    if guess < numberToGuess:
        print("too low")
    else: # I know it cant be equal or too low, so it
must be too high
        print("too high")
    guess = int(input("Please guess again:"))

print("Well done! Yes the number was ", numberToGuess)
```

4. Extra: get the program to generate a random number between 0 and 100 to guess (I am not giving the answer to this)

## For Loops

5. Write a program (average.py) that keeps reading numbers until the user enters a 0. (the program should append each of them into a list)  
The program should then print out each of the numbers entered and the average of them. (Use a list)

```
enter number (0 to quit): 33
enter another (0 to quit): 34
enter another (0 to quit): 0
33
34
The average is 33.5
```

Answer

```
# This program reads in numbers until
# the user enters 0
# it will then print back out again
# and their average

numbers = []

# first number then we check if it is 0 in the while loop
number = int(input("enter number (0 to quit): "))

while number != 0:
    numbers.append(number)

    # read the next number and check if 0
    number = int(input("enter another (0 to quit): "))

for value in numbers:
    print (value)

# I want average to be a float
average = float(sum(numbers)) / len(numbers)
print (f"The average is {average}")
```

6. Write a program (topthree.py) generates 10 random numbers (0-100) , prints them out then prints out the top three. (there are concepts I have not covered yet in this question)

10 random numbers	[34, 70, 48, 17, 77, 55, 68, 93, 36, 67]
The top 3 are	[93, 77, 70]

Answer

```
# This program generates 10 random numbers.
# prints them out, then
# prints out the top 3

# I will use a list to store and
# manipulate the numbers

import random
# I programming the general case
howMany      = 10
topHowMany   = 3
rangeFrom    = 0
rangeto      = 100

numbers = []

for i in range(0,howMany):
    numbers.append(random.randint(rangeFrom,rangeto))
print (f"{howMany} random numbers\t {numbers}")

# I am keeping the original list maybe I don't need to
topOnes = numbers.copy()

topOnes.sort(reverse = True)
print ("The top {topHowMany} are \t\t {topOnes[0:topHowMany]}")
```