VIDEO 5 : WHILE LOOP, BREAK & CONTINUE

Previously I talked about how you can loop with for. We can also continue looping as long as a condition is true with a while loop. While loops are used when you don't know how many times you will have to loop.

Here we'll generate a random number with the random module and randrange(). We will then use the while loop to guess the random value and output it.

CODE

```
# We can use the random module to generate random numbers
import random

# Generate a random integer between 1 and 50
rand_num = random.randrange(1, 51)

# The value we increment in the while loop is defined before the loop
i = 1

# Define the condition that while true we will continue looping
while (i != rand_num):

    # You must increment your iterator inside the while loop
    i += 1

# Outside of the while loop when we stop adding whitespace
print("The random value is : ", rand_num)
```

Break & Continue

Break and continue are very useful. Continue stops executing the code that remains in the loop and jumps back to the top. While break ends execution and jumps directly to the code that lies immediately outside of the loop.

Here we'll cycle from 0 to 20 with a while loop. If a number is even will use continue to skip printing it. If it is odd we'll print it. We'll then end execution with break if the value ever reaches 15.

CODE

```
i = 1
 while i <= 20:

    # If a number is even don't print it
    if (i % 2) == 0:
        i += 1
        continue

    # If i equals 15 stop looping
    if i == 15:
        break
```

```
    # Print the odds
    print("Odd : ", i)

    # Increment i
    i += 1
```

Python Problem for you to Solve

For this problem I want you to draw a pine tree after asking the user for the number of rows. This problem is the most difficult you have had so far, but it will teach a lot. Feel free to use any resources online to solve it.

Here is the sample program

```
How tall is the tree : 5
      #
     ###
    #####
   #######
 #########
      #
```

Here are some additional tips to help you solve the problem.

Tip 1

You should use a while loop and 3 for loops.

Tip 2

I know that this is the number of spaces and hashes for the tree
4 - 1
3 - 3
2 - 5
1 - 7
0 - 9
Spaces before stump = Spaces before top

TIP 3

You will need to do the following in your program :

1. Decrement spaces by one each time through the loop
2. Increment the hashes by 2 each time through the loop
3. Save spaces to the stump by calculating tree height - 1
4. Decrement from tree height until it equals 0
5. Print spaces and then hashes for each row
6. Print stump spaces and then 1 hash

Solution

CODE

```
# Get the number of rows for the tree
tree_height = input("How tall is the tree : ")

# Convert into an integer
tree_height = int(tree_height)

# Get the starting spaces for the top of the tree
spaces = tree_height - 1

# There is one hash to start that will be incremented
hashes = 1

# Save stump spaces til later
stump_spaces = tree_height - 1

# Makes sure the right number of rows are printed
while tree_height != 0:

    # Print the spaces
    # end="" means a newline won't be added
    for i in range(spaces):
        print(' ', end="")

    # Print the hashes
    for i in range(hashes):
        print('#', end="")

    # Newline after each row is printed
    print()

    # I know from research that spaces is decremented by 1 each time
    spaces -= 1

    # I know from research that hashes is incremented by 2 each time
    hashes += 2

    # Decrement tree height each time to jump out of loop
    tree_height -= 1

# Print the spaces before the stump and then a hash
for i in range(stump_spaces):
    print(' ', end="")

print("#")
```