Loop operation in Python programs

- Loop operations are used to perform some operation multiple times, for example, print “Hello World” 10 times.
- There are two loop statement in Python: **for** and **while**

For loop example

The range represents numbers starting from 0 and ending at 5-1

Note ":" symbol

```
for x in range(5):
    print("x=", str(x))
```

The indent indicates the blocks to be repeated

Program output

```
x= 0
x= 1
x= 2
x= 3
x= 4
```

while loop example

The condition to repeat the instructions

```
x=0
while x<5:
    print("x=", x)
    x=x+1
```

Note ":" symbol

The indent indicates the blocks to be repeated

Program output

```
x= 0
x= 1
x= 2
x= 3
x= 4
```

Nested for loop example

Range represents the numbers from 1 to 9

```
for x in range(1, 10):
    line = ""
    for y in range(1, x+1):
        line = line + str(x)+"X"+str(y)+"="+str(x*y)+" "
    print(line)
```

The first loop

The second loop

Program output

```
1X1=1
2X1=2 2X2=4
3X1=3 3X2=6 3X3=9
4X1=4 4X2=8 4X3=12 4X4=16
5X1=5 5X2=10 5X3=15 5X4=20 5X5=25
6X1=6 6X2=12 6X3=18 6X4=24 6X5=30 6X6=36
7X1=7 7X2=14 7X3=21 7X4=28 7X5=35 7X6=42 7X7=49
8X1=8 8X2=16 8X3=24 8X4=32 8X5=40 8X6=48 8X7=56 8X8=64
9X1=9 9X2=18 9X3=27 9X4=36 9X5=45 9X6=54 9X7=63 9X8=72 9X9=81
```

Can you print the multiplication table like this?

```
1X1=1 1X2=2 1X3=3 1X4=4  1X5=5  1X6=6  1X7=7  1X8=8  1X9=9
      2X2=4 2X3=6 2X4=8  2X5=10 2X6=12 2X7=14 2X8=16 2X9=18
            3X3=9 3X4=12 3X5=15 3X6=18 3X7=21 3X8=24 3X9=27
                  4X4=16 4X5=20 4X6=24 4X7=28 4X8=32 4X9=36
                         5X5=25 5X6=30 5X7=35 5X8=40 5X9=45
                                6X6=36 6X7=42 6X8=48 6X9=54
                                       7X7=49 7X8=56 7X9=63
                                              8X8=64 8X9=72
                                                     9X9=81
```

Lect4_multiTable2.py @ 4hjccc.github.io

A guessing game

```
import random
num = random.randint(1, 15)
cnt=1
correct = False

while((not correct) and cnt<=4 ):
    guess = input("Enter your number (1-15): ")
    guess_num = int(guess)
    if (guess_num>num):
        print("Your guess is too large")
    elif (guess_num<num):
        print("Your guess is too small")
    else:
        print("Your guess is correct!")
        correct = True
    cnt = cnt+1

if (correct):
    print("You win the game")
else:
    print("You lose the game. The number is", num)
```

Randomly select an integer from 1 to 15

Repeat if guess is not correct and has not tried for more 4 times

A guessing game

Program output

```
Enter your number (1-15): 8
Your guess is too small

Enter your number (1-15): 12
Your guess is too small

Enter your number (1-15): 14
Your guess is too small

Enter your number (1-15): 15
Your guess is correct!
You win the game
```

Break the loop

- You can stop the loop using **break** command

```
for k in range(10):
    if k==5:
        break
    print(k)
```

```
0
1
2
3
4
```

Today's Challenge

Spyder (Python 3.7)

File Edit Search Source Run Debug Consoles P

Editor - C:\Users\work\Documents\4Hjccc\code\lect1_challeng

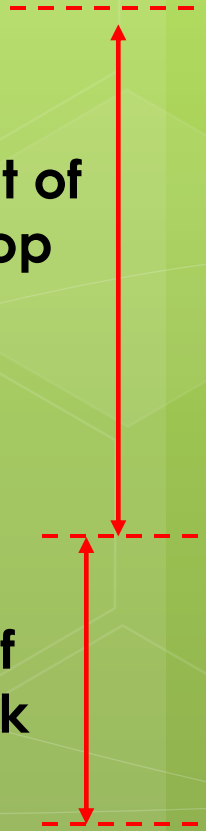
lect1.py | lect1_challenge.py

```
1 # -*- coding: utf-8 -*-
2 """
3 Created on Sun May 26 19:09:25 2019
4
5 @author: work
6 """
7
8 print("           A")
9 print("          AAA")
10 print("         AAAAA")
11 print("        AAAAAAA")
12 print("       AAAAAAAAA")
13 print("      AAAAAAAAAAA")
14 print("     AAAAAAAAAAAAA")
15 print("    AAAAAAAAAAAAAAA")
16 print("   AAAAAAAAAAAAAAAAA")
17 print("  AAAAAAAAAAAAAAAAAAA")
18 print("           H")
19 print("           H")
20 print("           H")
21 print("           H")
22 print("           H")
23 print(" --------------------")
```

```
          A
         AAA
        AAAAA
       AAAAAAA
      AAAAAAAAA
     AAAAAAAAAAA
    AAAAAAAAAAAAA
   AAAAAAAAAAAAAAA
  AAAAAAAAAAAAAAAAA
 AAAAAAAAAAAAAAAAAAA
          H
          H
          H
          H
          H
 --------------------
```

Can you write a program that take your specification of tree size and print it automatically?

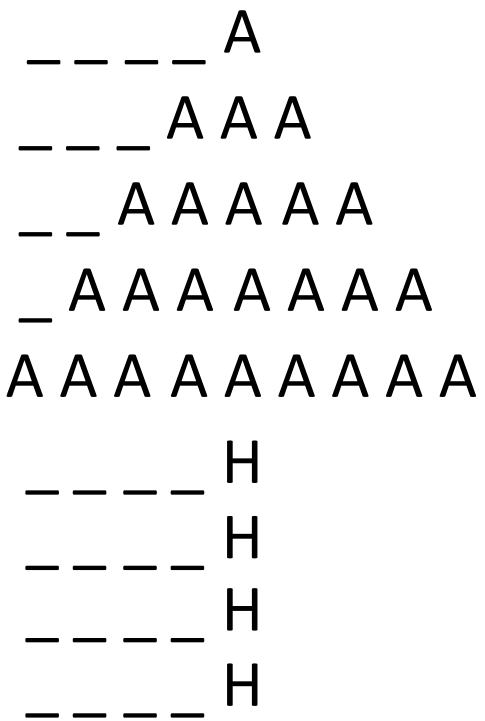
Today's Challenge




```
Please enter the height of tree top:11

please enter the height of the tree trunk:5
           A
          AAA
         AAAAA
        AAAAAAA
       AAAAAAAAA
      AAAAAAAAAAA
     AAAAAAAAAAAAA
    AAAAAAAAAAAAAAA
   AAAAAAAAAAAAAAAAA
  AAAAAAAAAAAAAAAAAAA
 AAAAAAAAAAAAAAAAAAAAA
           H
           H
           H
           H
           H
           H
-----------------------
```

Today's Challenge



1A 4 space

3A 3 space

5A 2 space

7A 1 space

9A 0 space

1H 4 space

2*k-1 "A"

treetop-k space

Solution

```
tree_top_height = input("Please enter the height of tree top:")
tree_trunk_height =  input("please enter the height of the tree trunk:")
treetop = int(tree_top_height)
treetrunk = int(tree_trunk_height)

# print the tree top
for x in range(1, treetop+1):
    line=""
    for k in range(1, treetop-x+1):
        line=line+" "
    for k in range(1, 2*x):
        line=line+"A"
    print(line)

# print the tree chunk
line=""
for x in range(1, treetop):
    line = line+" "
line = line + "H"

for x in range(treetrunk):
    print(line)

# print the tree base
line = ""
for x in range(2*treetop-1):
    line = line+"-"
print(line)
```