

Computer Engineering

วิศวกรรมคอมพิวเตอร์



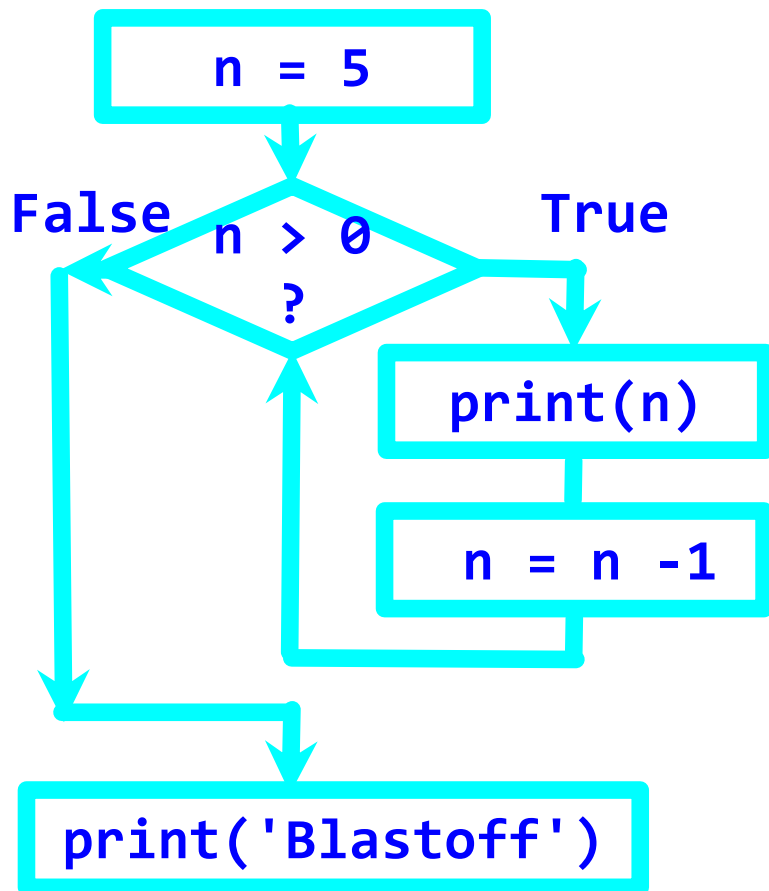
บทที่ 4 การเขียนโปรแกรมแบบวนซ้ำ(while)

สาขาวิชาวิศวกรรมคอมพิวเตอร์ คณะวิศวกรรมศาสตร์

สถาบันเทคโนโลยีพระจอมเกล้าเจ้าคุณทหารลาดกระบัง

Repeated Steps

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Program:

```

n = 5
while n > 0 :
    print(n)
    n = n - 1
print('Blastoff!')
print(n)
  
```

Output:

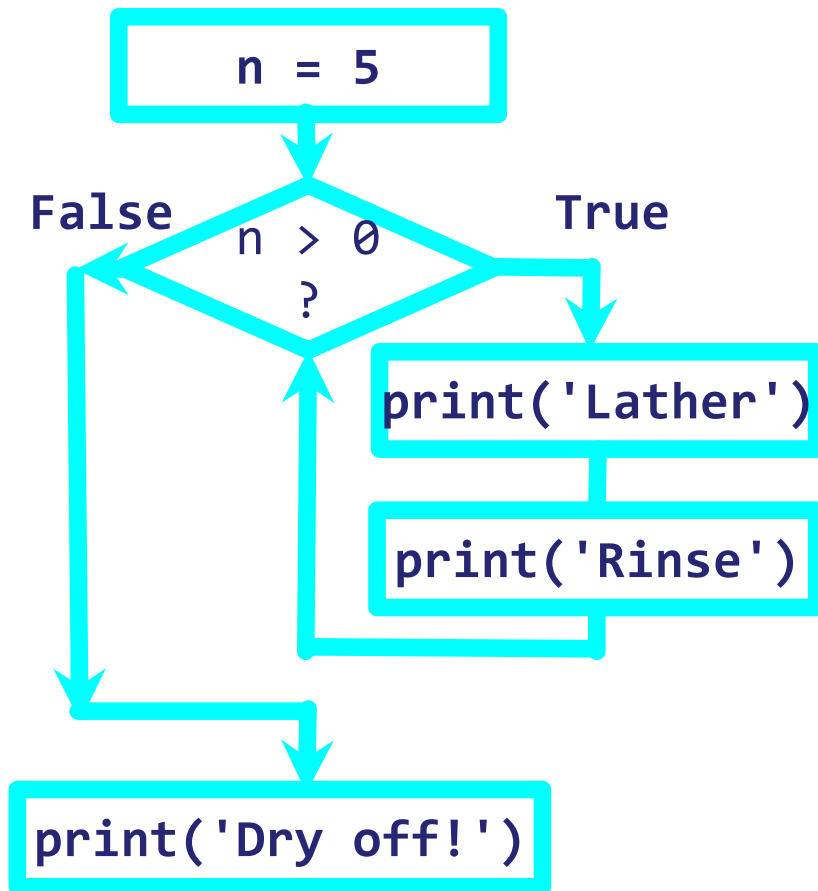
5
4
3
2
1
Blastoff!
0

iteration variables

iteration variables

An Infinite Loop

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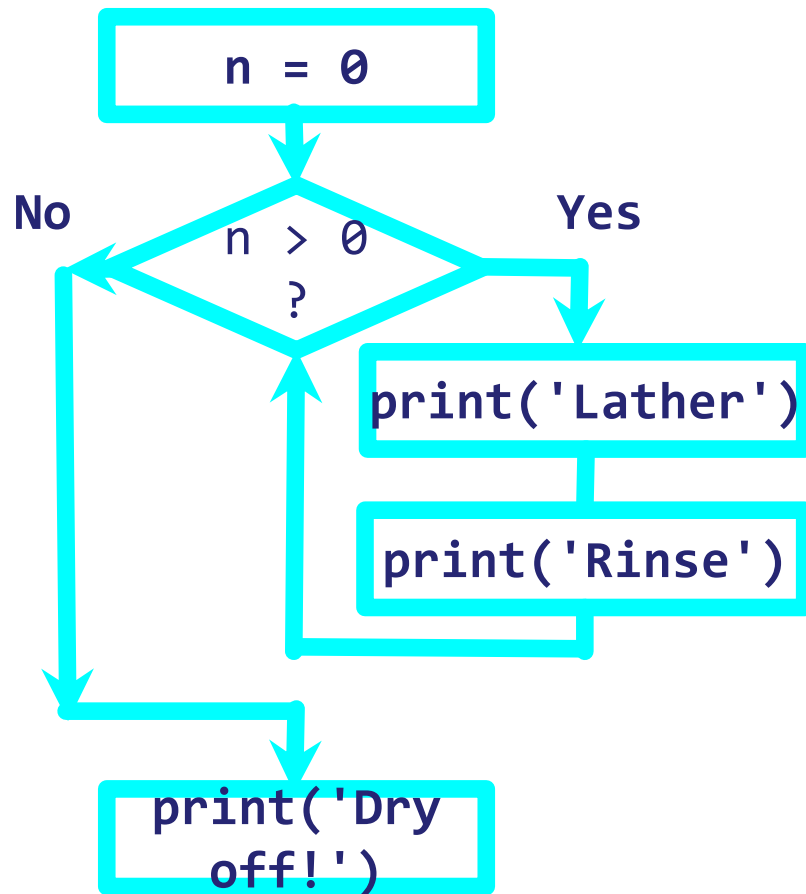


```
n = 5
while n > 0 :
    print('Lather')
    print('Rinse')
    print('Dry off!')
```

What is wrong with this loop?

Another Loop

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```

n = 0
while n > 0 :
    print('Lather')
    print('Rinse')
    print('Dry off!')
  
```

What is this loop doing?

โปรแกรมแสดงผลตัวเลข 0 – 10 | while



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จงเขียนผังงานและโปรแกรมที่มีการควบคุมทิศทางแบบวนรอบ โดยใช้คำสั่ง while เพื่อแสดงตัวเลข 0 - 10 ออกทางหน้าจอ

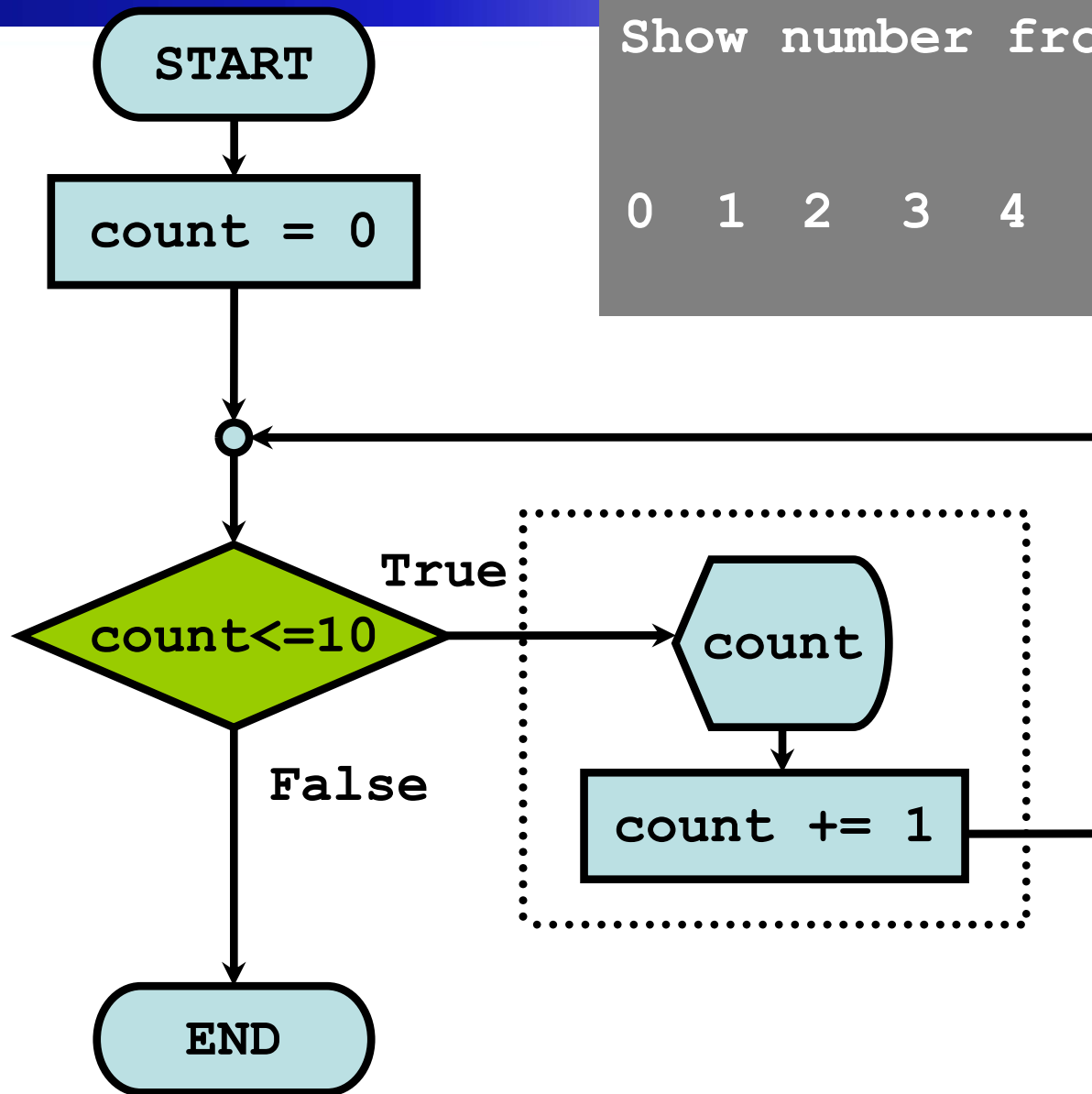
```
*** Show number 0 to 10 ***  
0 1 2 3 4 5 6 7 8 9 10  
===== End of Program =====
```



count = 11

Show number from zero to ten

0 1 2 3 4 5 6 7 8 9 10



โปรแกรมแสดงผลตัวเลข 0 – 10 | while



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```
print(" *** Show number 0 to 10 ***")
count = 0
while count <= 10:
    print(f"{count} ", end="")
    count += 1
print("\n==== End of Program =====")
```

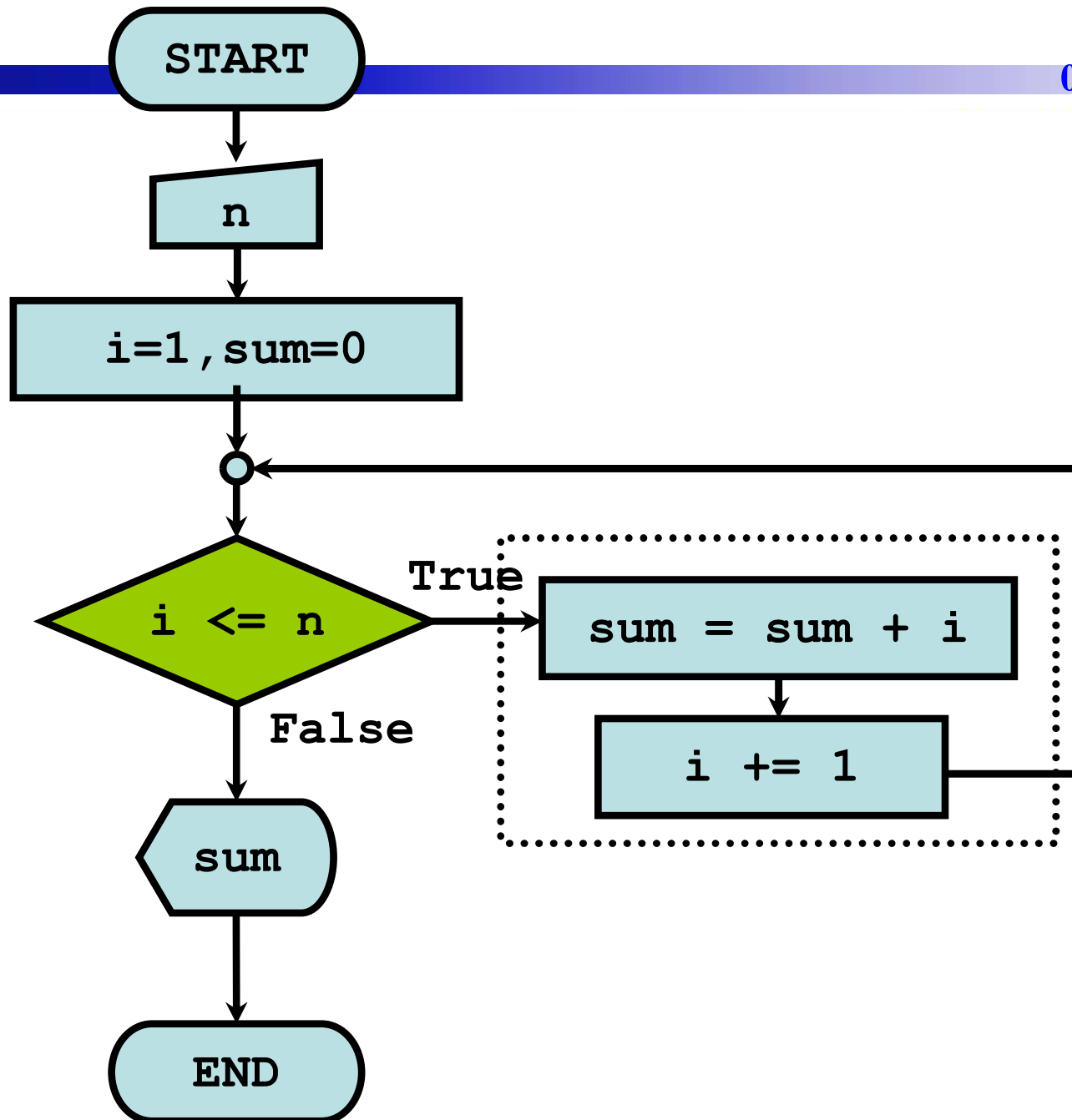
```
*** Show number 0 to 10 ***
0 1 2 3 4 5 6 7 8 9 10
===== End of Program =====
```

โปรแกรมแสดงผลรวมตัวเลข 1 ถึงค่าที่กำหนด

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จงเขียนผังงานและโปรแกรมที่มีการควบคุมทิศทางแบบวนรอบ โดยใช้คำสั่ง while เพื่อให้โปรแกรมทำการบวกเลขจำนวนเต็ม ตั้งแต่ 1 จนถึงค่าที่ผู้ใช้งานกำหนด

- Output Analysis
 - ผลลัพธ์การบวกเลขจำนวนเต็ม ตั้งแต่ 1 ถึงค่าที่ผู้ใช้งานกำหนด
- Input Analysis
 - ค่าที่ผู้ใช้งานป้อนเข้ามา



โปรแกรมแสดงผลรวมตัวเลข 1 ถึงค่าที่กำหนด



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```
print(" *** Summation from 1 to n ***")
n = int(input("Enter n : "))
sum = 0
i = 1
while i<=n:
    sum += i
    i += 1
print(f"Summation from 1 to {n} = {sum:,d}")
```

```
*** Summation from 1 to n ***
Enter n : 32
Summation from 1 to 32 = 1,056
```

Breaking Out of a Loop



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- The break statement ends the current loop and jumps to the statement immediately following the loop
- It is like a loop test that can happen anywhere in the body of the loop

```
while True:
    line = input('> ')
    if line == 'done' :
        break
    print(line)
print('Done!')
```

```
> hello there
hello there
> finished
finished
> done
Done!
```

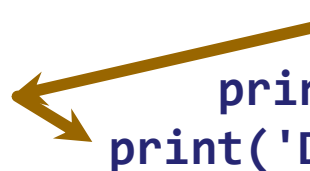
Breaking Out of a Loop



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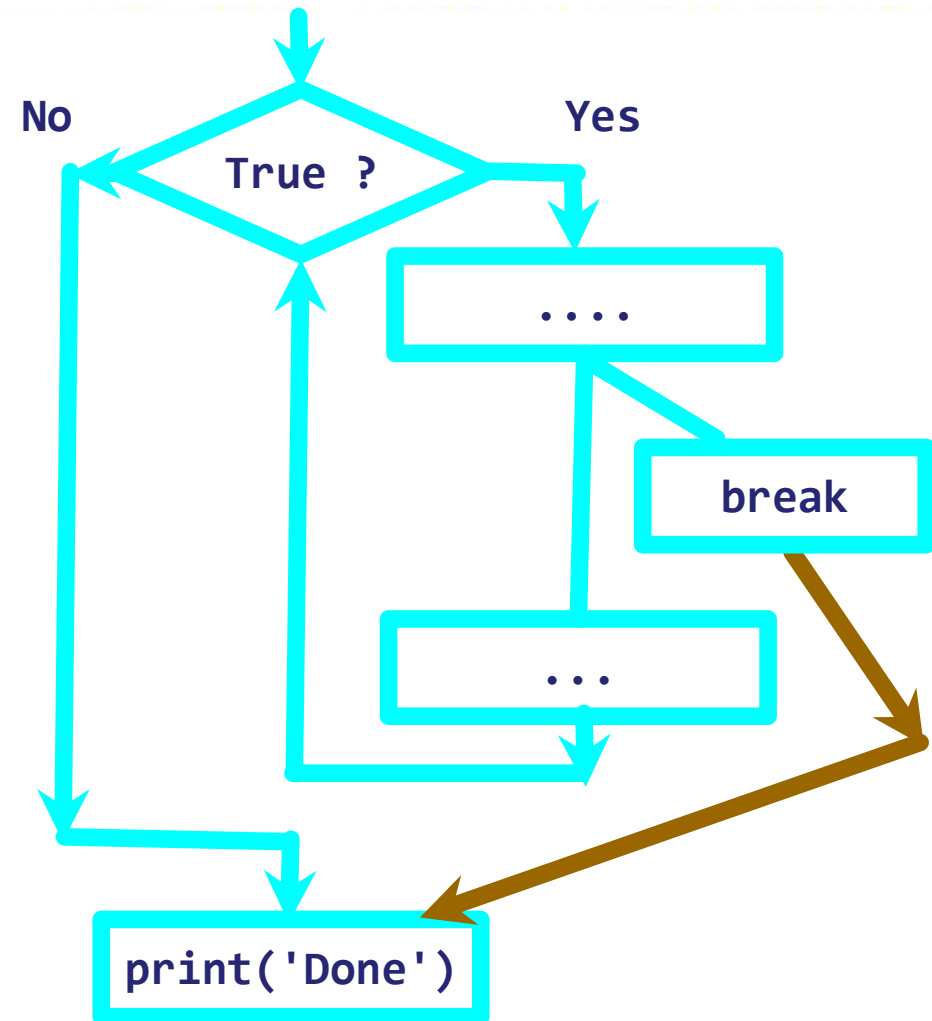
- The break statement ends the current loop and jumps to the statement immediately following the loop
- It is like a loop test that can happen anywhere in the body of the loop

```
while True:
    line = input('> ')
    if line == 'done' :
        break
    print(line)
    print('Done!')
```

A yellow arrow points from the 'break' statement to the 'print('Done!')' statement, indicating that the loop is terminated and execution jumps to the statement following the loop.

```
> hello
hello
> finished
finished
> done
Done!
```

```
while True:
    line = input('> ')
    if line == 'done' :
        break
    print(line)
    print('Done!')
```



[http://en.wikipedia.org/wiki/Transporter \(Star Trek\)](http://en.wikipedia.org/wiki/Transporter_(Star_Trek))

Finishing an Iteration with continue

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The continue statement ends the current iteration and jumps to the top of the loop and starts the next iteration

```
while True:
    line = input('> ')
    if line[0] == '#' :
        continue
    if line == 'done' :
        break
    print(line)
print('Done!')
```

```
> hello there
hello there
> # don't print
this
> print this!
print this!
> done
Done!
```

Finishing an Iteration with continue



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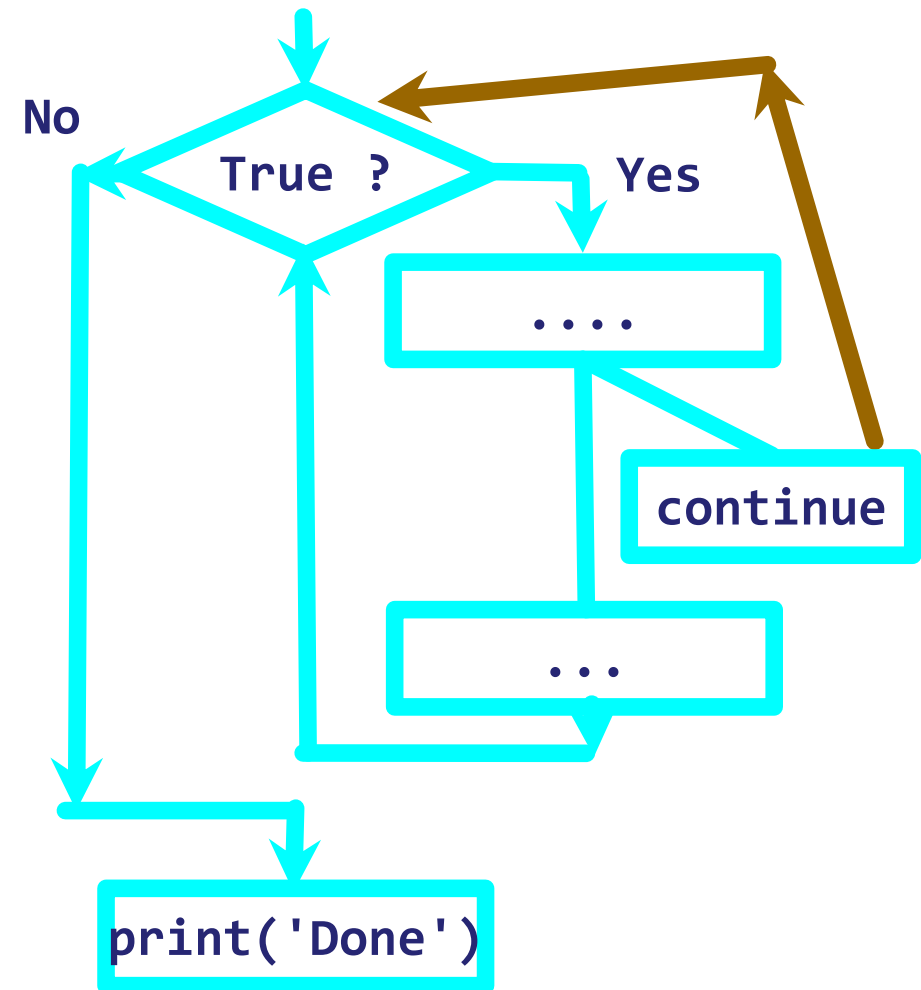
The continue statement ends the current iteration and jumps to the top of the loop and starts the next iteration

```
while True:
    line = input('> ')
    if line[0] == '#' :
        continue
    if line == 'done' :
        break
    print(line)
print('Done!')
```

A diagram with two yellow arrows illustrates the loop's behavior. One arrow starts at the 'continue' statement and points back to the top of the 'while' loop, indicating that the current iteration is skipped and the next one begins. The second arrow starts at the 'break' statement and points downwards, indicating the end of the loop.

```
> hello there
hello there
> # don't print
this
> print this!
print this!
> done
Done!
```

```
while True:
    line = raw_input('> ')
    if line[0] == '#' :
        continue
    if line == 'done' :
        break
    print(line)
print('Done!')
```



ord, chr function

```
ch, num = "A", ord("A")  
print(f'ch = {ch}, num = {num:d} = 0x{num:X}')
```

```
ch = A, num = 65 = 0x41
```

```
num = ord("Abx")  
print(f'ch = {ch}, num = {num:d} = 0x{num:X}')
```

```
Traceback (most recent call last):  
File "<string>", line 1, in <module>  
TypeError: ord() expected a character, but string of length 3 found
```

โปรแกรมแสดงผล a – z

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```
print(" *** Show Alphabet ***")
i=0
while i<26:
    num = ord("a") + i
    char = chr(num)
    print(f"{char} ", end="")
    i += 1
print("\n==== End of Program =====")
```

```
*** Show Alphabet ***
a b c d e f g h i j k l m n o p q r s t u v w x y z
===== End of Program =====
```

โปรแกรมแสดงผลข้อความแบบใช้ while loop

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```
name = "Python creator: Gudio van Rossum"
length = len(name)
print(f"length = {length}")
print(f"name = {name}")
i = 0
while i<length:
    print(name[i], end="")
    i += 1
print("\n==== End of program =====")
```

```
length = 32
name = Python creator: Gudio van Rossum
Python creator: Gudio van Rossum
===== End of program =====
```

การแสดงผลข้อความทีละตัว

01006012 Computer Programming

```
name = "Python creator: Gudio van Rossum"
length = len(name)
print(f"name = {name}")
print(f"length = {length}")
i = 0
while i<=5:
    print(f"name[{i}] = {name[i]} = 0x{ord(name[i]):02X} =
    {ord(name[i]):>04d}")
    i += 1
print("==== End of program =====")
```



การแสดงผลข้อความทีละตัว

01006012 Computer Programming

```
name = Python creator: Guido van Rossum
```

```
length = 32
```

```
name[0] = P = 0x50 = 0080
```

```
name[1] = y = 0x79 = 0121
```

```
name[2] = t = 0x74 = 0116
```

```
name[3] = h = 0x68 = 0104
```

```
name[4] = o = 0x6F = 0111
```

```
name[5] = n = 0x6E = 0110
```

```
===== End of program =====
```



โปรแกรมแสดงผลสี่เหลี่ยม while loop

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```
*** Draw square ***  
Enter size : 5  
*****  
*****  
*****  
*****  
*****  
*****  
===== End of program
```

```
*** Draw square ***  
Enter size : 3  
***  
***  
***  
===== End of program =====
```

โปรแกรมแสดงผลสี่เหลี่ยม while loop

01006012 Computer Programming

```
print(" *** Draw square ***")
str = input("Enter size : ")
num = int(str)
row = 0
ch = "*"
while row < num :
    col = 0
    while col < num :
        print(f"{ch}",end="")
        col += 1
    print()
    row += 1
print("==== End of program =====")
```

โปรแกรมแสดงผลสี่เหลี่ยม 2



01006012 Computer Programming

```
Enter size : 5
```

```
$=$=$
```

```
=$=$=
```

```
$=$=$
```

```
=$=$=
```

```
$=$=$
```

```
===== End of program =====
```

```
*** Draw square ***
```

```
Enter size : 9
```

```
$=$=$=$=$
```

```
=$=$=$=$=
```

```
$=$=$=$=$
```

```
=$=$=$=$=
```

```
$=$=$=$=$
```

```
=$=$=$=$=
```

```
$=$=$=$=$
```

```
=$=$=$=$=
```

```
$=$=$=$=$
```

```
===== End of program =====
```


โปรแกรมแสดงผลสี่เหลี่ยม while loop

01006012 Computer Programming

```
print(" *** Draw square2 ***")
str = input("Enter size : ")
num = int(str)
row = 0
while row < num :
    col = 0
    while col < num :
        if (row+col)%2 == 0 :
            ch = "$"
        else :
            ch = "="
        print(f"{ch}",end="")
        col += 1
    print()
    row += 1
print("==== End of program =====")
```



โปรแกรมแสดงผลพีระมิด

01006012 Computer Programming

```
*** Draw pyramid ***  
Enter size : 5  
      *  
     ***  
    *****  
   *********  
  ***********  
 ***** End of program *****
```

```
*** Draw pyramid ***  
Enter size : 9  
      *  
     ***  
    *****  
   *********  
  ***********  
 ***** End of program *****
```

โปรแกรมแสดงผลพีระมิด (1)

01006012 Computer Programming

```
print(" *** Draw pyramid ***")
str = input("Enter size : ")
num = int(str)
row = 0
while row < num :
    col = 0
    while col < 2*num-1 :
        if (row+col >= num-1) and col < (row + num) :
            ch = "*"
        else :
            ch = " "
        print(f"{ch}", end="")
        col += 1
    print()
    row += 1
print("==== End of program =====")
```

โปรแกรมแสดงผลพีระมิด

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row	*** Draw pyramid ***	Space	*
---	Enter size : 9	-----	-----
0	*	8	1
1	***	7	3
2	*****	6	5
3	*****	5	7
4	*****	4	9
5	*****	3	11
6	*****	2	13
7	*****	1	15
8	*****	0	17
	===== End of program =====	num-row-1	2*row+1

โปรแกรมแสดงผลพีระมิด (2)

01006012 Computer Programming

```
print(" *** Draw pyramid ***")
str = input("Enter size : ")
num = int(str)
row = 0
space = ' '
star = '*'
while row < num :
    line = space * (num-row-1)
    line += star * (2*row+1)
    print(line)
    row += 1
print("==== End of program =====")
```



Summary

01006012 Computer Programming

- while loops (indefinite)
- Infinite loops
- Iteration variables
- break
- continue
- Code Visualization
- len function
- ord function
- chr function
- String subscript
- Nested loop
- Program Development