

CSC 280 Introduction to Computer Science: Programming with Python

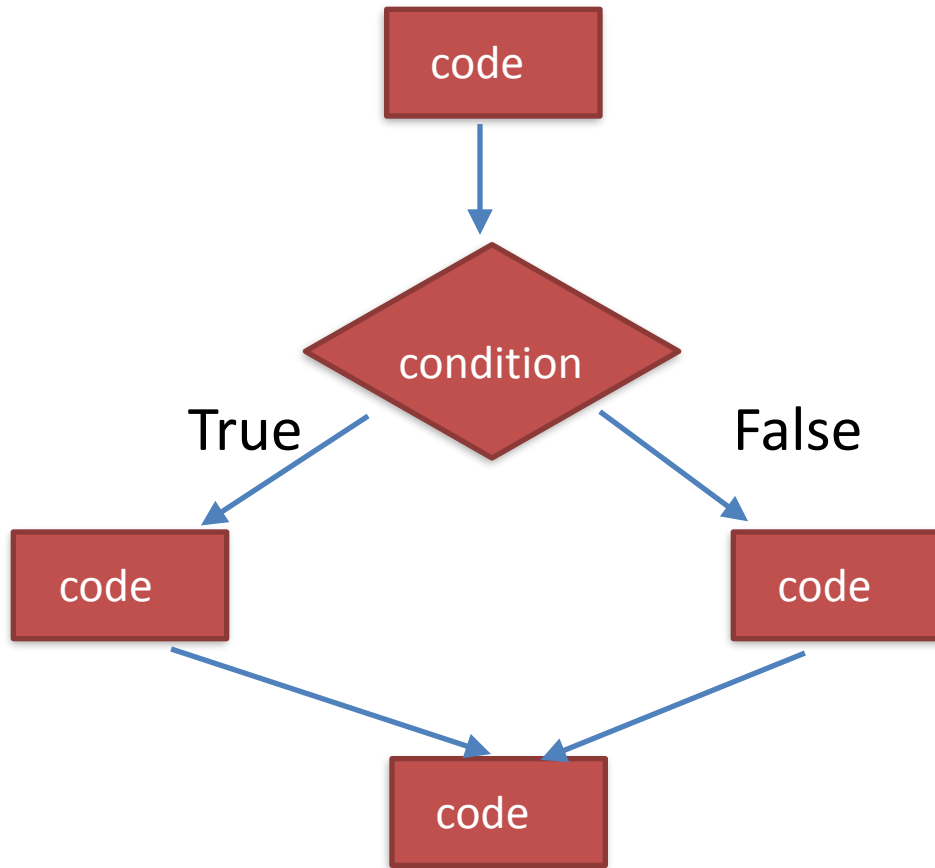
Lecture 4 : Iterations

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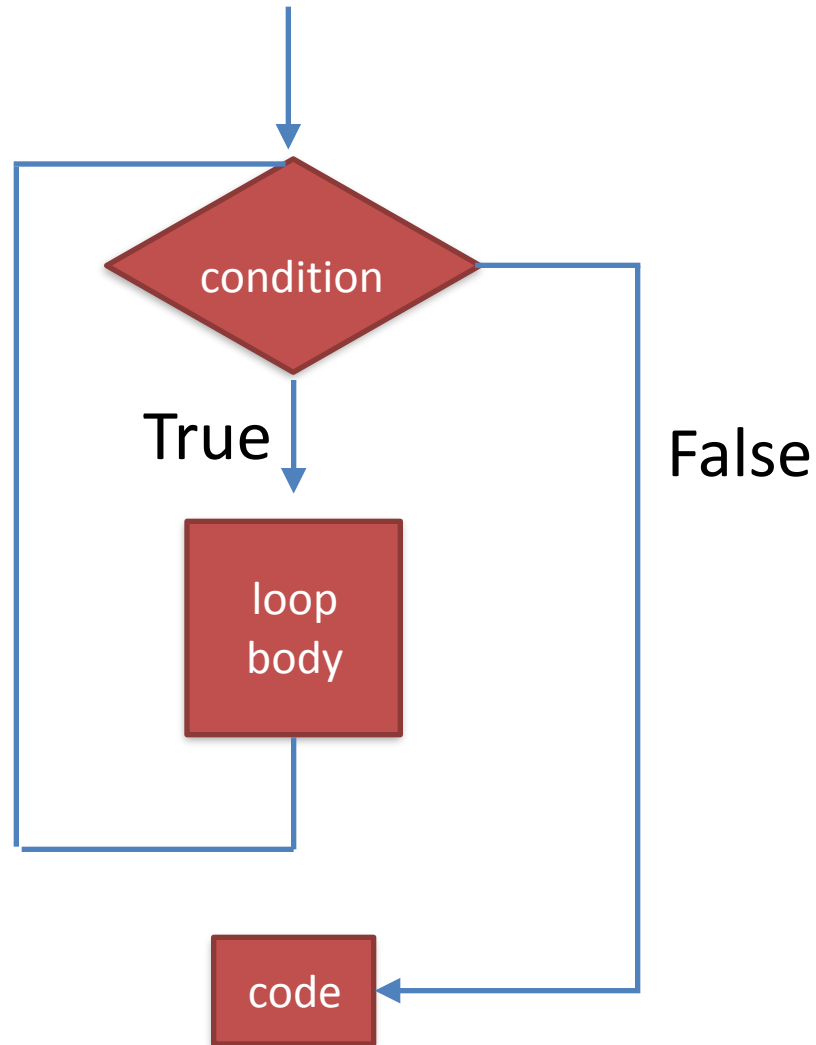
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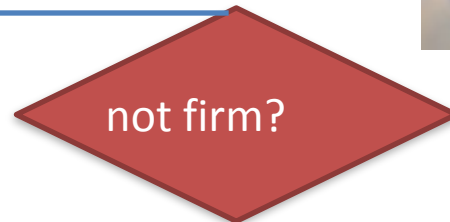
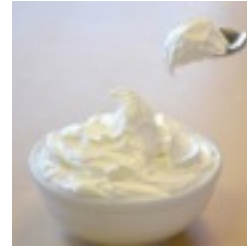
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Recall conditionals



Iteration

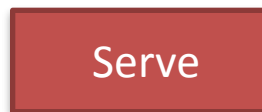




Yes



No



While Loop

```
while <Boolean expression>:
```

```
    stmt1
```

```
    stmt2
```

```
stmt3
```

Demo: compute square

- Hand-simulating: What happened at each iteration?
- Write it down
- What happens if I remove the test after “while”?
- How about if I make “ $x = 3.5$ ”, what will happen to the code?

Example: are you bored?

- Ask the user to say whether they are bored yet. The can answer “yes” or “no”.
- Repeat the question until the user typed “yes”.

What have we seen so far?

- data: numbers, strings, boolean
- statements
- operators, +, -, *, **, /, %, etc.
- Commands: assignment, input/output, conditionals, loop mechanism.
- Other goodies: comments, type checking, indentations, good use of variable names, test all possible branches.

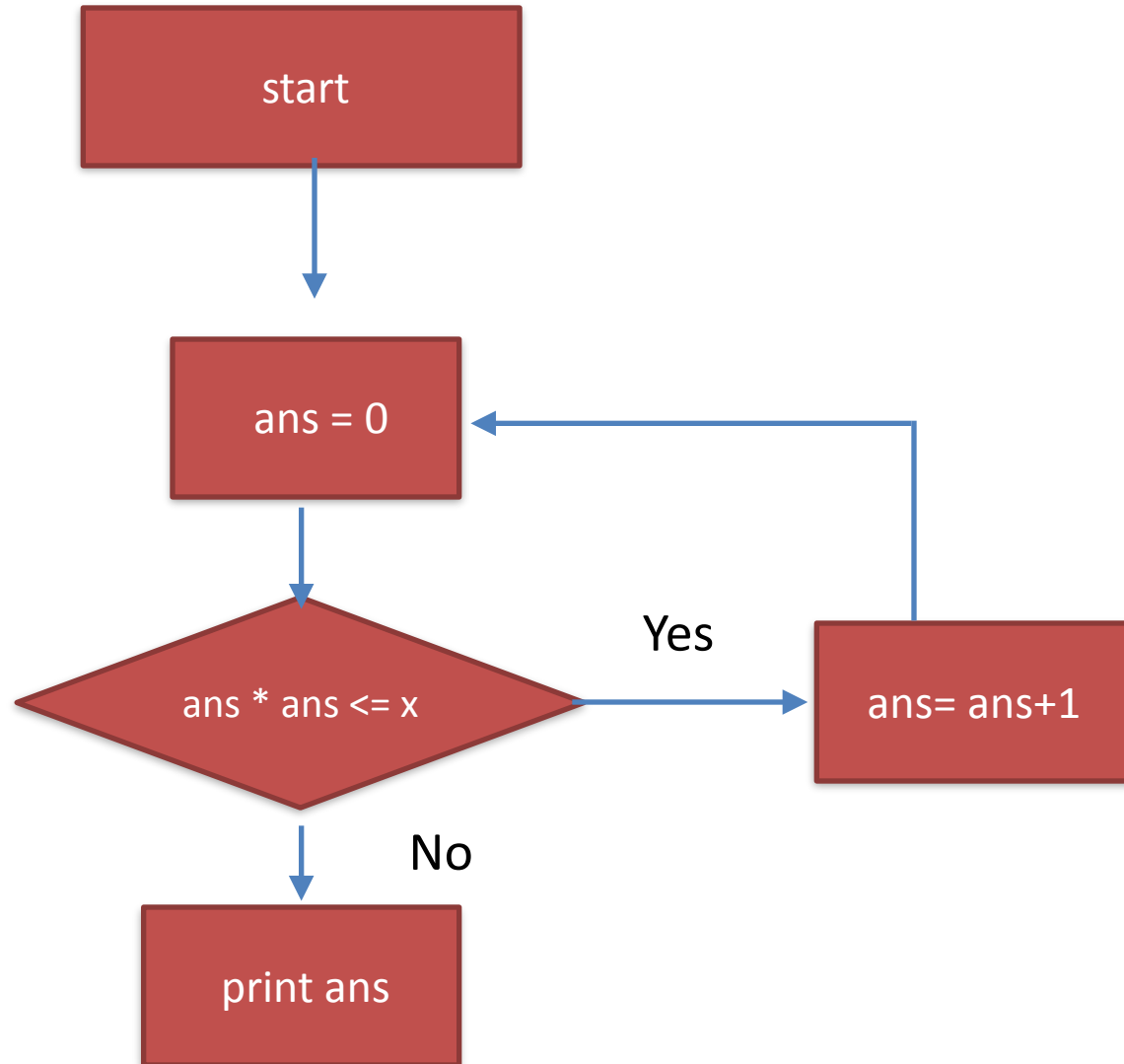
Iterative programming

1. choose a variable that going to count
2. initialize the variable outside the loop
3. set up the end test (variable), termination condition.
4. construct the block, changing the variable (decrementing function)
5. what should I do when I am done?

Demo: compute square root

1. $x = 25$, compute the square root
2. start with $y = 1$, is $y^*y > x$, no
3. $y = y+1$, is $y^*y \leq x$, no,
4.
6. until $y^*y = 25$, end, print y

Flowchart



Questions to ask about while loop:

- To what value x does the code terminate?
- To what value of x does the code give me the right answer?

Exhaustive Enumeration

- Exhaustively going through **all possibilities** until you find the right answer. For example: find the cube root of a perfect cube.
- They are not that slow, try find square root of `29325364648` and remove the print statement.

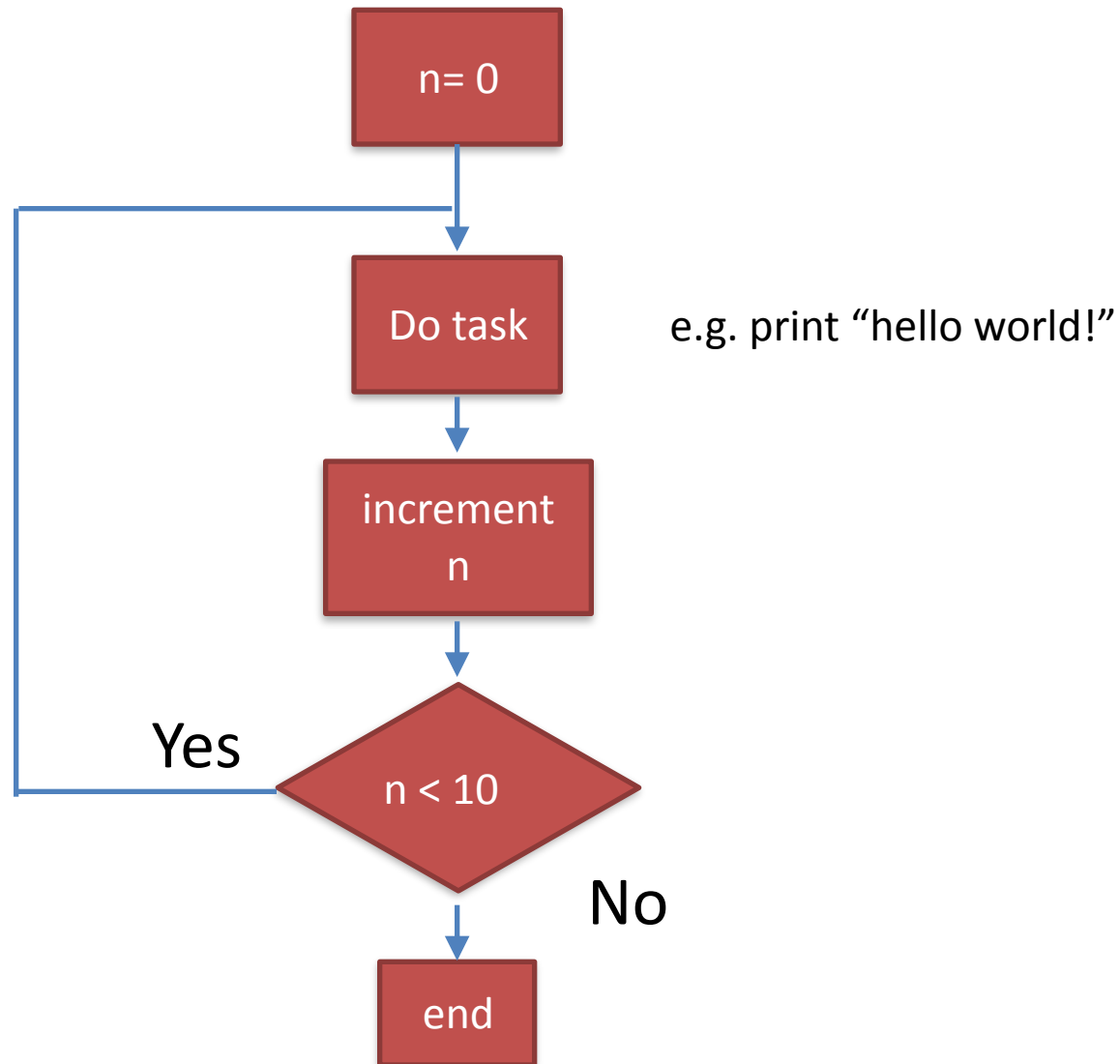
For loop

```
for <var> in <some collection> :  
    code block
```

Going through a predefined sequences automatically without worrying about explicit updates.

As long as collection is finite, the loop will end.

For Loop



For loop

for var in a sequence

for i in range (0, 4):

 print i

Demo: divisor using for loop

- `range()`, Python function

Quiz: yell out the answers

- `range(5,10)`
- `range(0, 10, 3)`
- `range (-10,-100, 30)`
- `range(1,7)`
- `range(5, -1, -1)`

Quiz: Types

Python automatically infers the type from the value you assign to the variable. Write down the type of the values stored in each of the variables below. Pay special attention to punctuation: values are not always the type they seem!

1. `a = False`
2. `b = 3.7`
3. `c = 'Alex'`
4. `d = 7`
5. `e = 'True'`
6. `f = 17`
7. `g = '17'`
8. `h = True`
9. `i = '3.14.159'`

take-home exercise

- Write a program that ask users to input 10 integers, and then prints the largest odd number. If no odd number is entered, it should print a message to that effect.
- Hint: combine While loop and If statement.