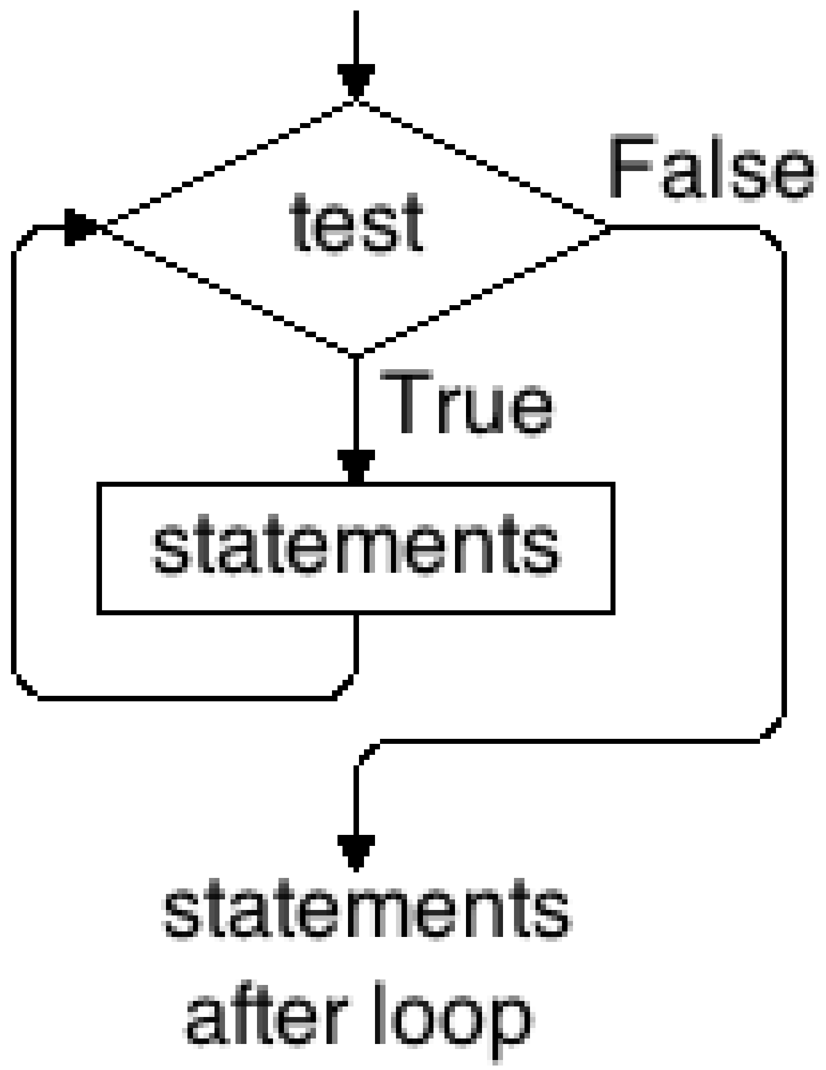
More About Loops

while loops



- The **while** loop is the simplest kind of loop
  - The ***test*** is performed before the statements are executed
    - Thus, if the ***test*** is initially **False**, the while loop does nothing
    - If the test is **True**, the statements are executed, then the ***test*** is performed again
- The ***statements*** must eventually cause the test to become **False**, else you have a so-called infinite loop

while loop initialization

- A common idiom is to set something up before the while loop, and tweak it at the bottom of the loop

  -
    ```
    Get some value
    while something about the value:
        do some things with the value
        get another value
    ```

  - **Example:**
    ```
    password = input("Enter your password: ")
    while password != actual_password:
        print("That’s not your password!")
        password = input("Enter your password: ")
    ```

for loops I

- **for** loops execute their statements for a fixed number of values, setting the ***loop index*** to each value in turn
- The values can be in the form of a ***list***

  -
    ```
    names = ["Tom", "Dick", "Harry"]
    for name in names:
        print(name)
    ```
- The values can be in the form of a ***set***

  -
    ```
    names = {"Tom", "Dick", "Harry"}
    for name in names:
        print(name)
    ```
- The values can be in the form of a ***dictionary***

  -
    ```
    names = {"Tom": 25, "Dick": 23, "Harry": 25}
    for name in names: # steps through the keys
        print(name, "->", names[name])
    ```

for loops II

- **for** loops execute their statements for a fixed number of values, setting the ***loop index*** to each value in turn
- The values can be given by an ***iterator***, which is a function that provides values as needed
- The most common iterator is **range**
  - **range(*start*, *end*)** produces integer values starting with ***start*** and going up to, but not including, ***end***
  - **range(*end*)** is equivalent to **range(0, *end*)**
  - **range(*start*, *end*, *step*)** produces integer values starting with ***start*** and going up by steps of ***step***, up to but not equalling or exceeding ***end***
  - **Example:**

```
for i in range(1, 10):
    print(i, i * i, i ** 3, i ** 4)
```

break

- The **break** statement is used to exit a loop early
- **Example:**

```
for i in range(1, 6):
    if i == 4:
        break
    print(i)
```

  produces

```
1
2
3
```

- If there is any reason to use a **break** that isn't within an **if** statement, I can't think of it
- Many programmers feel it is bad style to *ever* use a **break**
- I recommend using a **break** only as a last resort, if you can't figure out a better way to exit a loop normally

continue

- The **continue** statement is used to skip the rest of the loop and go back to the top
- **Example:**

```
for i in range(1, 6):
    if i == 4:
        continue
    print(i)
```

  produces

```
1
2
3
5
```

- Like **break**, **continue** really only makes sense **within** an **if** statement
- While not as bad as **break**, many programmers don’t like to use **continue**
- Think about alternatives before using a **continue**

pass

- The **pass** statement is the easiest of all--it does nothing
- **pass** is used mostly as a placeholder, where a statement is required but you haven’t yet figured out what to do there
- **Example:**

```
if illegal_alien(candidate):
    pass
else:
    hire(candidate)
```

The End

Il semble que la perfection soit atteinte non quand il n'y a plus rien à ajouter, mais quand il n'y a plus rien à retrancher.

It seems that perfection is attained not when there is nothing more to add, but when there is nothing more to remove.

-- Antoine de Saint Exupéry