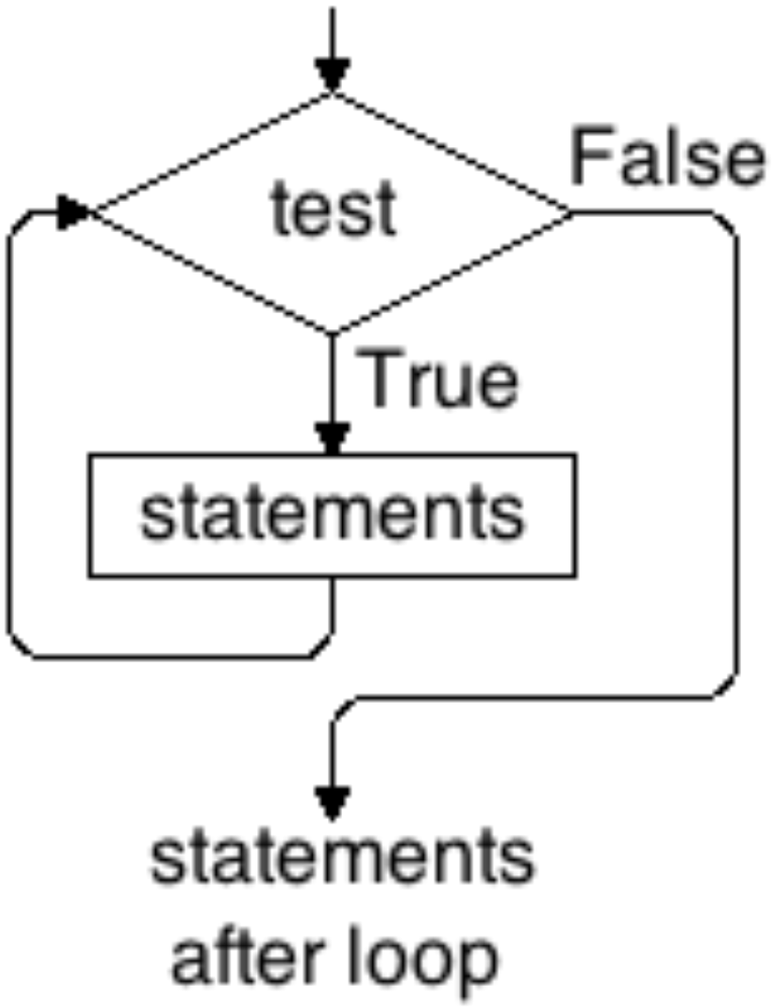
# More About Loops

# `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