Conditionals

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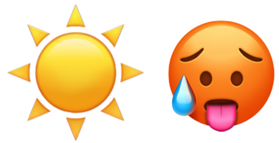
How Do We Make Decisions in a Program?

A conditional statement, or if statement, lets us make decisions in Python



If it's sunny and 90° and higher

Stay inside!

If it's raining

Stay inside!

Otherwise

Go outdoors!

The 6 Python Comparators

<	<=	==	>=	>	!=
less than	less than equal to	equal	greater than equal to	greater than	NOT equal

Assigning `95` *to the* `temp` *variable*

```
>>> temp = 95
>>> temp == 95
True
```

Making a comparison is like asking the question:

Is the `temp` *equal to* `95`*?*

Notice: the assignment is 1 = sign

And the equals to comparator is 2 == signs

The 6 Python Comparators

<	<=	==	>=	>	!=
less than	less than equal to	equal	greater than equal to	greater than	NOT equal

Is the temperature less than 90?

```
>>> temp = 95
>>> temp == 95
True

>>> temp < 90
False
```

An `if` statement

Lets us *decide* what to do: if *True*, then *do* this.

weather.py

```
temperature = 95

if temperature > 80:

    
```

Assign `95` *to the* `temperature` *variable*

Is the temperature greater than `80`*?*

If this is `True`*, let's add something to do here*

An `if` statement

Lets us *decide* what to do: if *True*, then *do* this.

weather.py

```
temperature = 95

if temperature > 80:
    print("It's too hot!")
    print("Stay inside!")
```

This is True

So these lines are run

```
> python3 weather.py
It's too hot!
Stay inside!
```

`if` Code Block

weather.py

```
temperature = 95

if temperature > 80:
    print("It's too hot!")
    print("Stay inside!")
```

Any indented code that comes after an if statement is called a code block

```
> python3 weather.py
It's too hot!
Stay inside!
```

When the `if` statement is `False`

weather.py

```
temperature = 75

if temperature > 80:
  print("It's too hot!")
  print("Stay inside!")
```

This is `False`

So these lines are NOT run

```
> python3 weather.py
```

And there is no output

The Program Continues After the `if` Code Block

weather.py

```
temperature = 75

if temperature > 80:
  print("It's too hot!")
  print("Stay inside!")
print("Have a good day!")
```

This is False

The program keeps running after the if statement and its code block, so this is printed after.

```
> python3 weather.py
Have a good day!
```

Rules for Whitespace in Python

weather.py

```
temperature = 75

if temperature > 80:
  print("It's too hot!")
    print("Stay inside!")
```

2 space indent

4 space indent

```
> python3 weather.py
File "weather.py", line 6
    print("Stay inside!")
    ^
IndentationError: unexpected indent
```

Whitespace indents in Python need to be consistent, otherwise there will be an IndentationError.

An `if`, `else` statement

weather.py

```
temperature = 75

if temperature > 80:
  print("It's too hot!")
  print("Stay inside!")
```

This is `False`

How do we do something else here if this is `False`*?*

An `if`, `else` statement

weather.py

```
temperature = 75

if temperature > 80:
  print("It's too hot!")
  print("Stay inside!")
else:
  print("Enjoy the outdoors!")
```

If this statement is `False`*, then run the code block below*

Otherwise, then run this code block

```
> python3 weather.py
Enjoy the outdoors!
```

if, elif, **and** else

weather.py

```
temperature = 50

if temperature > 80:
  print("It's too hot!")
  print("Stay inside!")
elif temperature < 60:
  print("It's too cold!")
  print("Stay inside!")
else:
  print("Enjoy the outdoors!")
```

False

True

So both of these lines are run.

```
> python3 weather.py
It's too cold!
Stay inside!
```

Can We Combine Two `if` Statements?

weather.py

```
temperature = 75

if temperature > 80:
  print("Stay inside!")
elif temperature < 60:
  print("Stay inside!")
else:
  print("Enjoy the outdoors!")
```

Let's shorten our program to only say: "Stay inside!" OR "Enjoy the outdoors!"

We're repeating `print("Stay inside!")`

Can we combine the first 2 `if` *statements?*

Logical Operator - `or`

weather.py

```
temperature = 75


if temperature > 80 or temperature < 60:
  print("Stay inside!")
else:
  print("Enjoy the outdoors!")
```

The keyword `or` *lets you combine multiple comparisons.*

At least one needs to be `True` *for the whole if statement to be* `True`

Logical Operator - `or`

Only *one* comparison needs to be *True* for the if statement to be *True*

weather.py

```
temperature = 75

if temperature > 80 or temperature < 60:
  print("Stay inside!")
else:
  print("Enjoy the outdoors!")
```

`False` `or` `False` → `False`

This is run

```
> python3 weather.py
Enjoy the outdoors!
```

Logical Operator - `or`

Only *one* comparison needs to be *True* for the if statement to be *True*

weather.py

```
temperature = 50

if temperature > 80 or temperature < 60:
  print("Stay inside!")
else:
  print("Enjoy the outdoors!")
```

False or True → True

This is run

```
> python3 weather.py
Stay inside!
```

Store the Forecast as a `String`

weather.py

```
temperature = 75
forecast = "rainy"
```

Let's add another variable with the forecast as "rainy", "cloudy", or "sunny".

Logical Operator - and

Both comparisons need to be `True` for the if statement to be `True`

weather.py

```
temperature = 75
forecast = "rainy"


if temperature < 80 and forecast != "rain":
    print("Go outside!")
else:
    print("Stay inside!")
```

Logical Operator - and

Both comparisons need to be `True` for the if statement to be `True`

weather.py

```
temperature = 75
forecast = "rainy"

          True   and   False → False
if temperature < 80 and forecast != "rain":
    print("Go outside!")
else:
    print("Stay inside!")  ◀·· This is run
```

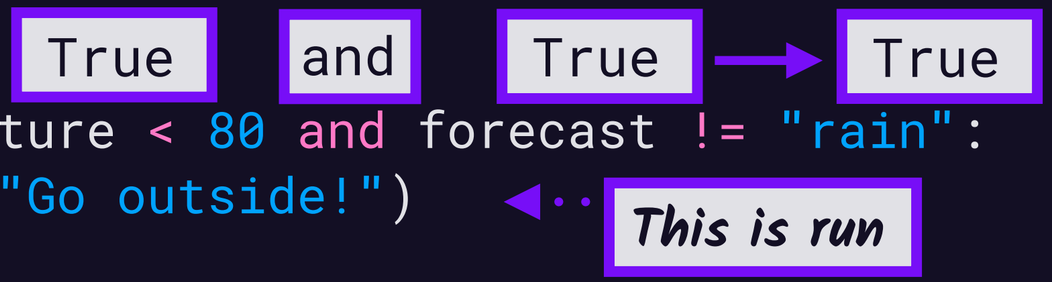
Logical Operator - and

Both comparisons need to be `True` for the if statement to be `True`

weather.py

```
temperature = 75
forecast = "sunny"

if temperature < 80 and forecast != "rain":
    print("Go outside!")
else:
    print("Stay inside!")
```



Logical Operator - `not`

The keyword `not` lets you negate a comparison. And can help make the statement more readable.

weather.py

```
forecast = "rainy"



if not forecast == "rainy"
    print("Go outside!")
else:
    print("Stay inside!")
```

Logical Operator - not

weather.py

```
forecast = "rainy"

if not forecast == "rainy"
    print("Go outside!")
else:
    print("Stay inside!")
```

not True → False

Negate means make the opposite:
not True → False,
not False → True

This is run

The 3 Python Logical Operators

and

or

not

The keywords `and` and `or` let you combine multiple comparisons

The keyword `not` lets you negate a comparison

All of the Primitive Data Types

```
>>> amount = 10
```

int

```
>>> amount = 10.50
```

float

```
>>> name = "Sarah"
```

string

```
>>> answer = True
```

boolean

A boolean **can store a** True **or** False **value**

Evaluating `Boolean` Variables

weather.py

```
raining = True
```

You can set boolean variables to either `True` *or* `False`

```
if raining:
    print("Stay inside!")
```

This reads more like English

```
> python3 weather.py
Stay inside!
```

Evaluating `Boolean` Variables

weather.py

```
raining = True

if not raining:
    print("Go outside!")
else:
    print("Stay inside!")
```

`not` `True` → `False`

This is run

```
> python3 weather.py
Stay inside!
```

Up Next:

Demo:
Rock, Paper, Scissors

Importing Modules

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A Random Rock, Paper, Scissors Game

How can we randomly pick the computer's choice?

The computer has the same choice every time

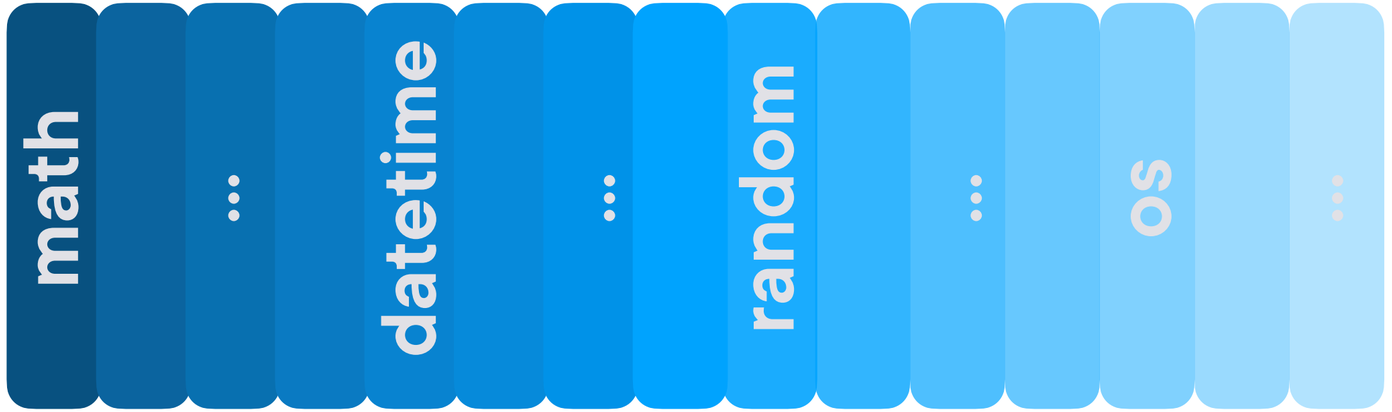
```
computer_choice = 'scissors'

user_choice = input("Do you want - rock, paper, or scissors?\n")
...
```

The user gets to pick a new choice for each game

When You Install Python

Python's built-in functionality

Our programs so far have just used Python and its built-in types and functions



Python Standard Library

But if you need something extra you can import it from the Python standard library

Looking Up the `random` Module

Using the `random` Module

roll_dice.py

```
import random

roll = random.randint(1,6)
```

We need to import the module to use it

This function will return a random number between 1 and 6

Using the `random` Module

roll_dice.py

```
import random

roll = random.randint(1,6)

print("The computer rolled a " + str(roll))
```

Don't forget to convert the int to a string to concatenate it.

```
> python3 roll_dice.py
The computer rolled a 6
```

If we ran this more times we would see different random numbers generated.

Using the `random` Module

roll_dice.py

```
import random

roll = random.randint(1,6)

guess = int(input('Guess the dice roll:\n'))
```

We want to convert the input to an `int` so we can compare `guess` to `roll`.

```
> python3 roll_dice.py
Guess the dice roll:
6
```

Using the `random` Module

roll_dice.py

```
import random

roll = random.randint(1,6)

guess = int(input('Guess the dice roll:\n'))

if guess == roll:
    print("Correct! They rolled a " + str(roll))
```

```
> python3 roll_dice.py
Guess the dice roll:
6
Correct! They rolled a 6
```

Using the `random` Module

roll_dice.py

```
import random

roll = random.randint(1,6)

guess = int(input('Guess the dice roll:\n'))

if guess == roll:
    print("Correct! They rolled a " + str(roll))
```

```
> python3 roll_dice.py
Guess the dice roll:
6
```

Why isn't there more output now?

We need an else statement for when the guess is wrong.

Using the `random` Module

roll_dice.py

```python
import random

roll = random.randint(1,6)
guess = int(input('Guess the dice roll:\n'))

if guess == roll:
    print("Correct! They rolled a " + str(roll))
else:
    print("Wrong! They rolled a " + str(roll))
```

```
> python3 roll_dice.py
Guess the dice roll:
6
Wrong! They rolled a 4
```

Up Next:

Demo: Randomize Rock, Paper, Scissors