Starter: Rewrite this code to use a for loop and the `range()` function:

In [8]:
```
print('~' * 0)
print('~' * 1)
print('~' * 2)
print('~' * 3)
print('~' * 4)
print('~' * 5)
print('~' * 6)
print('~' * 7)
print('~' * 8)
```

```
~
~~
~~~
~~~~
~~~~~
~~~~~~
~~~~~~~
~~~~~~~~
```

Comparisons and Logical Operators

Boolean: A data-type that is either `True` or `False`

Comparison operator: compare values to determine wheter something is `True` or `False`

This code checks if the user has input `'Monday'` using the `==` operator

In [10]:
```
today = input('What day is it? ')

is_monday = today == 'Monday'

print('Today is Monday: {}'.format(is_monday))
```

```
What day is it? Monday
Today is Monday: True
```

Summary of comparison operators in Python

Name	Python
Equal to	==
Not equal	!=
Greater than	>
Less than	<
Greater than or equal	>=
Less than or equal	<=

`float()` can convert strings to floats

This code checks if the current temperature is freezing:

In [11]:
```
temperature = input('What is the temperature? ')

is_freezing = float(temperature) <= 0.0

print('The temperature is freezing: {}'.format(is_freezing))
```

```
What is the temperature? 18
The temperature is freezing: False
```

Exercise 3.1: You have a budget of £10 and want to write a program to decide which burger restaurant to go to.

1. Input the `price` of a burger using `input()`
2. Check whether the `price` is less than or equal (`<=`) `10.00`
3. Print the result in the format below

```
Burger is within budget: True
```

Hint: remember to convert the input from a string to a decimal with `float()`

There are logical operators to combine multiple checks

Python	What it does
and	both expressions are `True`
or	at least one expression is `True`
not	reverse the expression (`True` becomes `False` and vice-versa)

This program will work out if you should visit Mars based on whether you want to visit and if you can afford it:

In [13]:
```
mars_choice = input('Would you like to visit Mars? y/n ')
is_willing = mars_choice == 'y'

affordable = input('Can you afford to visit Mars? y/n ')
can_afford = affordable == 'y'

should_visit_mars = is_willing and can_afford

print('You should visit Mars: {}'.format(should_visit_mars))
```

```
Would you like to visit Mars? y/n y
Can you afford to visit Mars? y/n n
You should visit Mars: False
```

Exercise 3.2: Add code to your burger program to input whether the restaurant has a vegetarian option

The output should say whether the cost is within budget **AND** has a vegetarian option

```
Restaurant meets criteria: True
```

If Statements

if statement: used to run a block of code depending on whether a condition is `True` or `False`

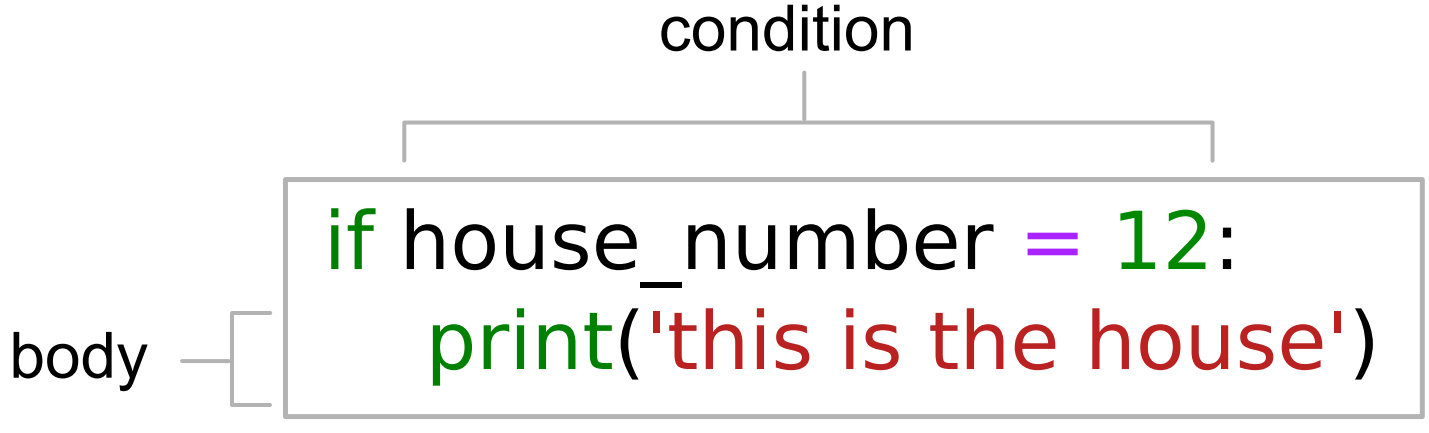
In [15]:
```
password = input('password: ')

if password == 'jumanji':
    print('Success!')
```

```
password: jumanji
Success!
```

An `if` statement has the following:

1. The `if` keyword
2. A condition (comparison)
3. A colon
4. Body (indented four spaces)


condition
body
if house_number = 12:
print('this is the house')

This program checks whether you are an admin and you have entered the right password:

In [16]:
```
name = input("What is your name? ")
is_admin = name == 'admin'

password = input("What is your password? ")
is_password_correct = password == 'dinosaurs'

if is_admin and is_password_correct:
    print('Welcome')

if not is_admin or not is_password_correct:
    print('Go away')
```

```
What is your name? admin
What is your password? tigers
Go away
```

Exercise 3.3: Rewrite the output of your burger program to use if statements

If it is a good choice it should be:

```
This restaurant is a great choice!
```

If it is **not** a good choice it should be:

```
Probably not a good idea
```

Else Statements

else statement: Used with an `if` statement and will run when the `if` condition is `False`

In [17]:
```
password = input('password: ')

if password == 'jumanji':
    print('Success!')
else:
    print('Failure!')
```

```
password: jumanji
Success!
```

Here's the admin program rewritten to use `else`:

In [19]:
```
name = input("What is your name? ")
is_admin = name == 'admin'

password = input("What is your password? ")
is_password_correct = password == 'dinosaurs'

if is_admin and is_password_correct:
    print('Welcome')

else:
    print('Go away')
```

```
What is your name? admin
What is your password? tigers
Go away
```

Exercise 3.4: Now that you've finished your burger, you want to pay for your food. Let's write a program to calculate your meal and apply a discount if applicable.

If your total meal costs more than £20 and you have a discount, the price will be reduced by 10%. The program should print "Discount applied" or "No discount" depending on whether the discount criteria was met.

In [ ]:
```
meal_price = float(input('How much did the meal cost? '))

discount_choice = input('Do you have a discount? y/n ')
discount_applicable = discount_choice == 'y'
```

Elif Statements

elif statement: used after `if` statements to check whether another condition is `True` or `False`

In [21]:
```
dog_size = int(input('How big is the dog in kilograms? '))

if dog_size > 75:
    print('That is a big dog')

elif dog_size < 25:
    print('That is a small dog')

else:
    print('That is an average dog')
```

```
How big is the dog in kilograms? 24
That is a small dog
```

You can use multiple `elif` statements together

In [22]:
```
dog_size = int(input('How big is the dog in kilograms? '))

if dog_size > 75:
    print('That is a big dog')

elif dog_size < 10:
    print('That dog could fit in my pocket')

elif dog_size < 25:
    print('That is a small dog')

else:
    print('That is an average dog')
```

```
How big is the dog in kilograms? 76
That is a big dog
```

Exercise 3.5: You're cooking a pizza and need to check that the oven is at the right temperature.

Write a program to:

- Ask the user to input the temperature
- Prints "The oven is too hot" if the temperature is over 200
- Prints "The oven is too cold" if the temperature is under 150
- Prints "The oven is at the perfect temperature" if the temperature is 180
- Prints "The temperature is close enough" for any other temperature

Random

Python has a built-in library for random data

In [ ]:
```
import random

random_integer = random.randint(1, 100)

print(random_integer)
```

The `randint()` function generates a random number between two values

This program uses `randint()` to simulate dice with any number of sides

In [23]:
```
import random

sides = int(input('How many sides does the die have? '))
random_integer = random.randint(1, sides)

print('You rolled a {}'.format(random_integer))
```

```
How many sides does the die have? 6
You rolled a 4
```

To practice if statements we will complete three different programs. The starting code for these programs in on the mini-site. Please download the three files now and save them in your CFG folder (with your other code):

- Exercise 3.6: Flip a coin
- Exercise 3.7: Rock, Paper, Scissors
- Exercise 3.8: Roulette

Exercise 3.6: This program uses random to simulate a coin flip.

To finish the program you will need to add the following:

- If the random coin flip matches the choice input by the user then they win
- Ohterwise if the random coin flip does not match the choice input by the user then they lose

Extension: Make the program still run even if the user enters their input in capitals or lowercase.

In [ ]:
```
import random

def flip_coin():
    random_number = random.randint(1, 2)
    if random_number == 1:
        side = 'heads'
    else:
        side = 'tails'
    return side

choice = input('heads or tails: ')
result = flip_coin()

print('The coin landed on {}'.format(result))
```

Exercise 3.7: This program simulates rock, paper, scissors. The first winning condition has been added. To finish the program you'll need to add all of the other winning and losing conditions.

- Paper wins rock
- Rock wins scissors
- Scissors wins paper

Remember: The same choice causes players to draw! For example scissors vs. scissors is a draw.

In [3]:

```
import random

def random_choice():
    choice_number = random.randint(1, 3)

    if choice_number == 1:
        choice = 'rock'
    elif choice_number == 2:
        choice = 'scissors'
    else:
        choice = 'paper'

    return choice

my_choice = input('Choose rock, scissors or paper: ')
opponent_choice = random_choice()

print('Your opponent chose {}'.format(opponent_choice))

if my_choice == 'rock' and opponent_choice == 'scissors':
    print('You win!')
```

```
Choose rock, scissors or paper: paper
Your opponent chose paper
```

Exercise 3.8: Not Quite Roulette

Ask the user to enter the following three things using `input()` : (1) The amount they want to bet. (2) a colour - red or black (3) and a number between 1 and 100

After generating a random number and colour:

- If the colour matches, the users keeps the amount that was bet
- If the number matches, the users wins double the amount that was bet
- If the colour and number matches, the users wins 100 times the amount that was bet
- When neither the colour or number matches the user wins 0
- Output: winning colour, winning number and the amount the user won

The following code will generate a random number and colour:

In [ ]:

```
import random

def colour():
    random_number = random.randint(1, 2)

    if random_number == 1:
        colour = 'red'
    else:
        colour = 'black'

    return colour


random_number = random.randint(1, 100)
random_colour = colour()
```

Recap

This session:

1. Comparison operators
2. Logical Operators
3. If Statements

Question 1: Equals to (==) is a comparison operator. Name two more comparison operators

Question 2: What is the output of this code?

In [ ]:
```
print(True and True)
print(True and False)
print(True or True)
print(True or False)
```

Question 3: I expect this code to output "This is too many apples", but instead it outputs "That is a sensible number of apples". Why does this happen?

In [ ]:

```
apples = 100

if apples >= 10:
    print('That is a sensible number of apples')
elif apples > 50:
    print('This is too many apples')
elif apples < 10:
    print('That is not enough apples')
```

Homework: Session 3 homework questions on the mini-site