Lesson 1

What is programming?

Giving instructions to a computer

to make it do what you want

do this
do that
say hi
calculate 97+153
draw a circle
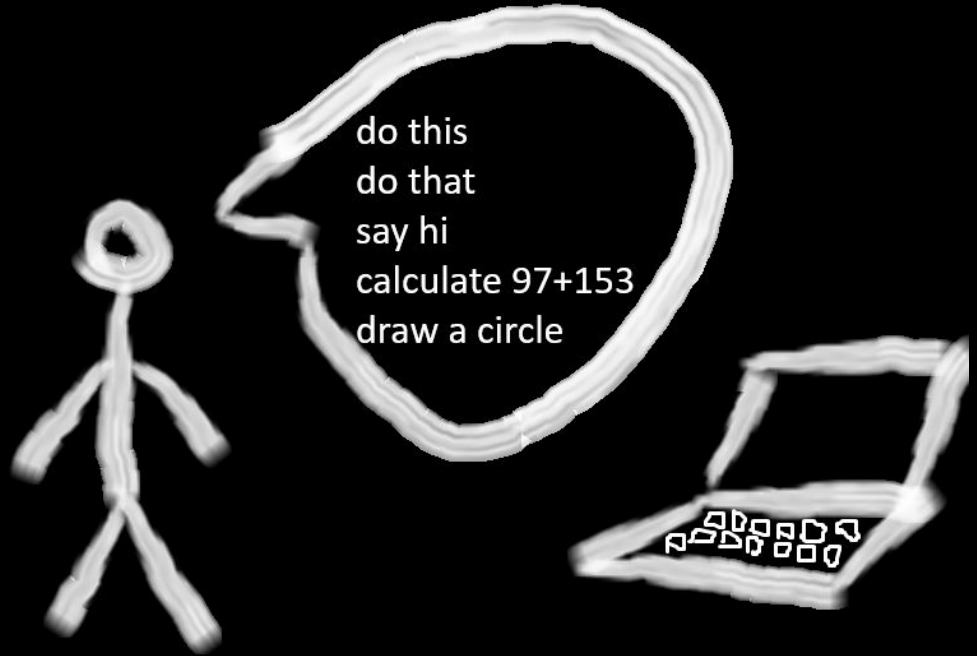
What is a programming language?

A language that computers understand.

English:

say hi
calculate 97+153

Python:

print("hi")
print(97+153)

Just like human languages
there are many programming languages

- English
- Spanish
- German
- Japanese
- Bulgarian

  …

- Python
- Scratch
- Java
- Javascript
- C++
- C#
- PHP

  …

It's very easy to switch
from one programming language to another

after learning the fundamental concepts

What is code?

A bunch of instructions that make up a program,

written in a programming language,

usually in a text file

snake.py

```
56    def run(self):
57        timeout = 0.05
58
59        while self.key != 'esc':
60            sleep(timeout)
61            with self.lock:
62                if self.key == 'space':
63                    # If SPACE BAR is pressed pause the snake and wait for
64                    # another
65                    self.key = None
66                    while self.key != 'space':
67                        sleep(timeout)
68                    self.key = self.prevKey
69                    continue
70
71                # Calculates the new coordinates of the head of the snake.
72                # NOTE: len(snake) increases. This is taken care of later at
73                # [1].
74                self.snake.insert(0, [
75                    self.snake[0][0] +
76                    (self.key == 'down' and 1) +
77                    (self.key == 'up' and -1),
78                    self.snake[0][1] +
79                    (self.key == 'left' and -1) +
80                    (self.key == 'right' and 1)
81                ])
82
83                # If snake crosses the boundaries, make it enter from the other
84                # side
85                if self.snake[0][0] == 0: self.snake[0][0] = 18
86                if self.snake[0][1] == 0: self.snake[0][1] = 58
87                if self.snake[0][0] == 19: self.snake[0][0] = 1
88                if self.snake[0][1] == 59: self.snake[0][1] = 1
```

Let's start programming!

Python, like every language, consists of words.

In programming we call them keywords.

- print
- if
- else
- for
- while
- def
- class
- continue
- import

print

print = Hey computer, write this on the console.

Anything you give to print
will be written on the console

print( )

The number 25 —> print(25)

The text "It is cold today" —> print("It is cold today")

⚠ The text "25" —> print("25")

Problem 1

Create a program that writes this to the console:

This is my christmas tree
```
        *
       ***
      *****
      ******
     *******
    ********
   *********
  **********
      **
```
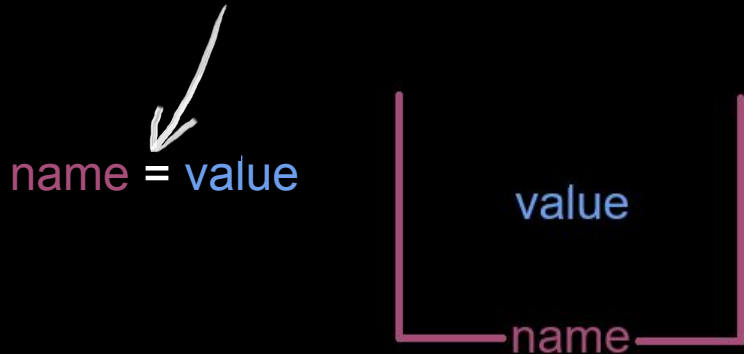
Variables

variable = a box that stores some value

$$x = 156$$

$$number\_of\_people = 8198377060$$

$$user\_name = \text{"David"}$$

$$seconds\_in\_a\_year = 60 * 60 * 24 * 365$$

This is how we create a variable
and assign a value to it

name = value

Types of variables

Number

x = 5
x = -5
x = 3.14
x = -5643.198432
x = 0.00000000000143
x = 3 + 2 * 5
x = (3 + 2) * 5

String (text)

x = "some text"
x = "3.14 is pi"
x = "anything really"
x = "hfdaf7eafha83r3fae8325"
x = "key" + "board"

Many other types...

...

x = 9 / 3 + 1   ⚠️

x has the value 4

x = "9 / 3 + 1"

x has the value "9 / 3 + 1"

Problem 2

Write a program that creates 3 variables

- name
- age
- favorite_color

containing your name, your age and your favorite color.

Then the program should write this text to the console:

Hi! My name is Boris and I'm 24 years old. My favorite color is orange.

replacing "Boris", 24 and "orange" with the values of the 3 variables.

Changing a variable's value

Variables can change their value while the program is running.

```
x = 6
print(x)
x = 10
print(x)
x = "fish"
print(x)
```

Incrementing

```
x = 3
print(x)
x = x + 3
print(x)
x += 3
print(x)
```

Decrementing

```
x = 3
print(x)
x = x - 3
print(x)
x -= 3
print(x)
```

Example

```
age = 12
print("You are " + str(age) + " now.")
age = age + 5
print("You will be " + str(age) + "in 5 years.")
age += 5
print("You will be " + str(age) + "in 10 years.")
```

Problem 3

Look at this file, run it first
    problem03.py
It has 2 sections
    on_start
    every_frame
where you can write your code.
Any code you write in on_start will be executed only once when you start the program.
Any code you write in every_frame will be executed every frame.
In both sections you have access to 2 variables - x and y - the position of the white square.

Your task is to make the square move
- right
- left
- up
- diagonally, to the top right corner
- towards the shadow square, to the left and a bit down

Problem 4

In a forest there are 4 wolves and 10 sheep.
Every day these 3 things happen
- Each wolf eats 1 sheep
- Wolves multiply by 2
- Sheep multiply by 3

Create a program that tells you how many wolves and sheep will there be after 4 days.

What if we start with 3 wolves and 10 sheep?

What about after 14 days?