

# Programming Thinking

## Session 3

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# Plan for this session

- Python basic datatypes

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- Variables

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- Operators



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- Python basic datatypes
- Variables
- Operators
- Basic functions



Datatypes tell Python how we want to use the data. There are several primitive data types in Python such as **bool**, **int**, **str**, **float**.

## Integers

Integers (or ints) represent whole numbers. We create them by using their numeric representation directly.

1

234

432432



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## Demo





## Floating point numbers

Floats represent numbers that have a fractional part. We use a dot to separate the integer and fractional parts:

3.14

1.0

33.33



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## Strings

Strings are used for textual representation. They can be created using either double or simple quotes.

*'this is a string'*

*"this is another string"*

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```
'this is a string'
```

```
"this is another string"
```

## Demo

Why can one use either double or single quotes? why just not agree on one of them?

## Booleans

Booleans represent truthiness. There are only two values in for the bool type in Python: **True** and **False**

True

False



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## Demo



# Getting the type of a value

We can always get the type of a value using the **type(value)** function

```
type("patata")
```

# Getting the type of a value

## Practice

Inside Spyder, check what's the type of the following expressions:

- `"there is some text here"`
- `1`
- `True`
- `44.4`
- `'true'`
- `'False'`
- `2`
- `'33.3'`





Operators are symbols in the language that perform different kinds of computations on values

They're **binary**, they will operate on two values.

# Arithmetic Operators

| symbol | meaning          |
|--------|------------------|
| +      | sum              |
| -      | subtraction      |
| *      | multiplication   |
| /      | division         |
| **     | exponentiation   |
| //     | floored division |
| %      | modulus          |



## Rules of precedence

- Parentheses

## Demo

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- Parentheses
- Exponentiation

## Demo



## Rules of precedence

- Parentheses
- Exponentiation
- Multiplication/Division

## Demo



## Rules of precedence

- Parentheses
- Exponentiation
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- Sum/Substraction

## Demo



## Rules of precedence

- Parentheses
- Exponentiation
- Multiplication/Division
- Sum/Substraction
- when operators have the same precedence, evaluate left to right

## Demo

# String operators

Sum and multiplication operators work on strings too. They're used to concatenate and multiply strings, respectively.



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Demo

Variables are names that point to values in Python. We declare them using the assignment operator (=).

```
variable_name = "value"
```

## Naming variables

It's important to be as descriptive as possible when naming variables  
There are some naming rules we should obey



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## Rules

- variable names can't start with a number
- variable names can't contain special characters such as `!`, `@`, `.`
- Can't be one of the reserved words

## Reserved words

|          |         |        |          |       |
|----------|---------|--------|----------|-------|
| and      | del     | from   | None     | True  |
| as       | elif    | global | nonlocal | try   |
| assert   | else    | if     | not      | while |
| break    | except  | import | or       | with  |
| class    | False   | in     | pass     | yield |
| continue | finally | is     | raise    |       |
| def      | for     | lambda | return   |       |

## Mutability

In Python variables are mutable. This means that we can change their value at any time

```
name = "Pepe"  
print(name)
```

```
name = "Jose"  
print(name)
```

# Converting values

There are some times when we need to convert a value from one type to another.

We use the **int()**, **bool()**, **str()**, and **float()** functions for that

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```
int('23')
```

```
bool(1)
```

```
bool(0)
```

```
str(True)
```

```
float("3.2")
```





# Printing output

One can print output using the **print()** function



There is a handy function **input()** that allows us to capture input from the user

```
name = input("Tell me your name: ")  
  
print("hello, " + name)
```

- Datatypes (int, float, bool, str)



# Recap

- Datatypes (int, float, bool, str)
- Variables (naming, mutability)



- Datatypes (int, float, bool, str)
- Variables (naming, mutability)
- Operators (arithmetic, precedence, string operators)



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- Converting values



- Datatypes (int, float, bool, str)
- Variables (naming, mutability)
- Operators (arithmetic, precedence, string operators)
- Converting values
- User input

# Exercises

- 1 Create a program that calculates the total number of seconds in an hour
- 2 How does the following expression evaluate?

`2 + (3 + 4) + (5 * 33 ** 34)`

- 3 Create a program that asks the user for their age and their mother's age and calculate the age difference
- 4 What are the results and result types of the following expressions?  
think it yourself, do not use the Python console for this

`3 * 5 * 2`

`3 / 11`

`3 // 11`

`25 % 2`

- 5 Make the following expressions work (use Python console for this one)  
`3 + "3" 'there are' + 4 ' dogs barking'`

