2.1 Constants and Variables

A1.1 use constants and variables, including integers, floating points, strings, and Boolean values, correctly in computer programs;

Computer programs don't do anything interesting if they don't take input, do something with it, and then give output.

How will you store the data? There are many options, and each programming language has their own set. In Python:

integers are whole numbers, positive or negative.

- Examples include `3`, `-145`, `8921` and `-48736510241`
- In Python 3, there is no limit to how long an integer can be.
- Python interprets raw numbers to be *decimal*. No binary or hexadecimal.

floating point numbers are numbers that *have* a decimal point.

- Examples include `3.0`, `-14.5`, `8.921` and `-487.36510241`
- You can use "e" for scientific notation:
  - `4e-3` = $4 \times 10^{-3} = 0.004$
  - `6.78e8` = $6.78 \times 10^{8} = 678{,}000{,}000$
- There is a maximum here: Anything larger gets replaced with `inf`
- There is a minimum too: Anything smaller gets repaced with `0`

complex numbers are also possible. You probably haven't seen these before.

- The complex number 4+7i is stored as `4+7j` in Python.

strings are sequences of character data. Anything that isn't completely numbers is probably a string.

- We used strings when we typed our first code into Python:

```
number1 = input("First number? ")
```

- The " " contains the string
- ' ' also work as quotes, but don't switch between the two mid-line.

```
number1 = input('First number? ') <-- This works
number1 = input('First number? ") <-- This doesn't
```

Constants are values that *do not* change as the computer program operates.

Variables are values that *do* change.

constant | ˈkänstənt |

noun

a situation or state of affairs that does not change: *the condition of struggle remained a constant.*

- *Mathematics* a quantity or parameter that does not change its value whatever the value of the variables, under a given set of conditions.
- *Physics* a number expressing a relation or property that remains the same in all circumstances, or for the same substance under the same conditions.