CSCI 141
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Data: Types and Values
Goals

• Know that different kinds of data are represented on a computer in different ways

• Know the meaning of the following types:
  • `str`, `int`, `float`

• Know how to use the type conversion functions `int`, `float`, `str`

• Know how to use the `type` function.
Data

What is data, anyway?

noun

facts and statistics collected together for reference or analysis.

*synonyms*: facts, figures, statistics, details, particulars, specifics, features;  

- the quantities, characters, or symbols on which operations are performed by a computer, being stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media.

- **PHILOSOPHY**
  things known or assumed as facts, making the basis of reasoning or calculation.
Data: Types and Values

Every piece of data has a value.

A value is a concrete piece of data, such as a number, or a character.

"a"             "Scott"

4               6.2
Data: **Types and Values**

- Different kinds of data are stored differently.
- Every piece of data also has a **type** (sometimes called **class**).
- We’ve seen 2 already:
  - “Hello world!”  
    - **String** (type **str**) - a sequence of characters
  - 3 (as in 3 * 4 + 2)  
    - **Integer** (type **int**) - an integer (whole number)
- Here’s another:
  - 3.14  
    - **Floating-point number** (type **float**): a number with a decimal point
Data Types: Why?

• All pieces of data have a type (sometimes also called class)

• Practical reasons:
  • Need to know how to store it in memory (how to encode it as 1’s and 0’s)
  • Need to know what you can do with it
    • can you compute 10 + "Scott"?
    • what about 1.1 + 2?
Data Types

• How do you find out what type a piece of data is?

  • Just ask! Python has a function called `type` which tells you the type, or class, of any value.
The type Function

• The type function takes one piece of data (a value) and gives back the type of the value.

• Examples:

  Function call:          Result:
  type(16)                <class 'int'>
  type("CSCI 141")       <class 'str'>
  type(16.0)              <class 'float'>

  16.0 is (mathematically) an integer, but the decimal point causes it to be interpreted as a float.
Data Type Conversions

• What if you have “1.4” (class str) but you want 1.4 (class float)?

• Here are three more functions:
  
  int()

  float()

  str()

• Each tries to convert its argument to the given type, and throws an error if it’s not possible.
type and type conversions: demo
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- type function
- int to int
- int to string
- float to int
- string to int
- string to float