Data Types

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Common Data Types

Numeric Data Types

- Integer, Float
- Arithmetic operations

Text Data Type

- String
- Manipulate the text

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Numeric Data Types

Create an integer

```
x = 7
x + 3
```

Name	Type	Size	Value
x	int	1	7

```
In [3]: x + 3
   ...:
Out[3]: 10
```

Create a Float

```
x = 7.0
x + 3.0
```

Name	Type	Size	Value
x	float	1	7.0

```
In [5]: x + 3.0
   ...:
Out[5]: 10.0
```

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Mixing Numeric Data Types

Add a float, an integer, and a Boolean

```
7 + 3.0 + True
```

- Boolean True = 1
- Boolean False = 0

```
In [6]: 7 + 3.0 + True
   ...:
Out[6]: 11.0
```

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String Data Types

Create a string

```
x = "a"
```

Name	Type	Size	Value
x	str	1	a

Add b to x

```
x + "b"
```

```
In [8]: x + "b"
Out[8]: 'ab'
```

Strings join together when added.

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Mixing Data Types

Name	Type	Size	Value
x	str	1	a

Try to add 3 to a string

```
x + 3
```

```
TypeError: must be str, not int
```

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Mixing Data Types – Take 2

Create a string

```
x = "7"
```

Name	Type	Size	Value
x	str	1	7

Add 3 to x

```
x + 3
```

```
TypeError: must be str, not int
```

Add "3" to x

```
x + "3"
```

```
In [13]: x + "3"
    ...:
Out[13]: '73'
```

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Data Types and Arrays

Use the Numpy package to create arrays

```
import numpy as np
```

Create an array of integers

```
x = np.array([5, -7, 1, 1, 99])
```

–Comma-separated elements in square brackets

Name	Type	Size	Value
x	int32	(5,)	array([5, -7, 1, 1, 99])

```
In [18]: type(x)
    ...:
Out[18]: numpy.ndarray
```

Elements in the array

Find out the data type for the elements in the array

```
x.dtype.name
int32
```

–means numeric data, integers.

Add 3 to the array, adds to each element

```
x + 3

array([  8,  -4,   4,   4, 102])
```


Array of Strings

Create an array of strings

x = np.array(["abc", "", " ", "?", "7"])

Name	Type	Size	Value
x	str96	(5,)	ndarray object of numpy module

Str96 means text

Cannot add 3 to a string – no matching types

Summary

- Data types are important for what kind of operations can be performed
- Operator +
  - Math on numeric data
  - Joining on text data
- Check the data type
  - Type(x)
  - X.dtype.name on an array