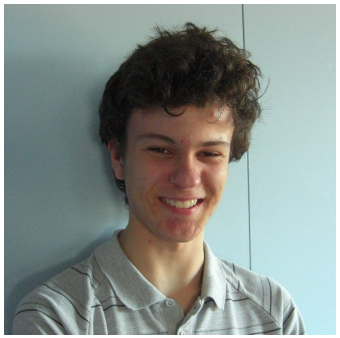
#CodeYork

Session 1

Who? What? When?



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Weekly Classes

3:20-4:20PM

Weekly Assignments

Optional, but good preparation

Game Driven Teaching

Battle against your friends

What’s a Python?

We’ll be using Python 3.5

Interpreted scripting language

Simple and readable

“Holy Grail” of prototyping and teaching

Used in data science, AI, sciences, web, scripting

https://python.org

Down to busyness

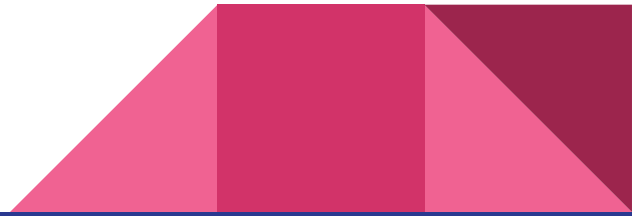
Quick recap of Python’s features

Variables, data types, if-elif-else, functions....

Not much practical work today

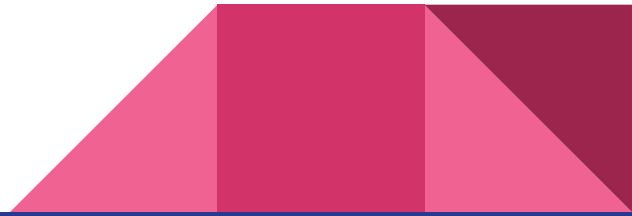
Use these slides as reference

Unlike Java or C#, indentation has meaning; be careful when copying into editor. Indent with 4 spaces, or tabs, but whatever you do, keep it the same, or your code may not even run. We will be using 4 spaces throughout our code samples.



Primitive Data Types

- Words and letters are strings (str)
  - ‘egg’ or “spam”
- Numbers with a decimal point are floating point numbers (float)
  - 124.0, 124e2, -0.123
- Numbers with no decimal point are integers (int)
  - 1, 124, 0, -5



Primitive Data Types

- Booleans give us logic
  - True, False
  - Must be capitalized, false is not False!
- Some things are nothing
  - ‘None’ (not ‘null’ like in Java!)

Operators and Conditionals

Arithmetic is pretty straightforward

1 + 2 - 3 * 4 / 5 ** 6 (try and figure out what this evaluates to!)

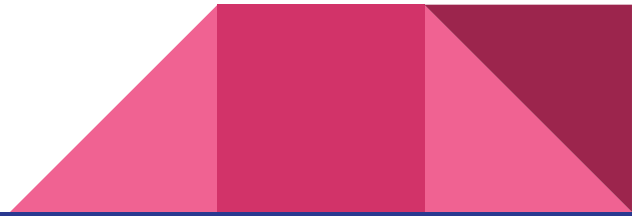
Booleans have algebra too

True and False, True or False , not True

Conditionals let us check for truth

1 == 1 (True), 1 > 1 (False)

<= means ‘less than or equal to’



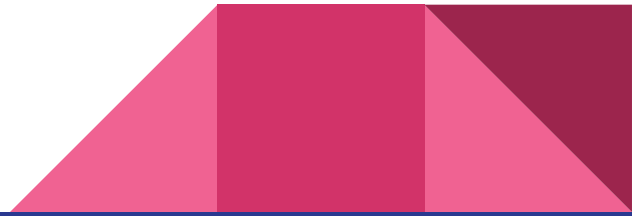
Operators Precedence

Some operations happen before others (operator precedence)

If two operators have equal precedence, left goes first (left associativity)

Think about what this means for subtraction…

4 - 3 - 2 = (4 - 3) - 2 = 1 - 2 = -1



Variables

Variables let you store stuff

x = 5, y = “hey”

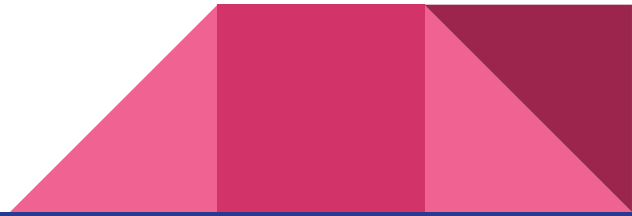
No types, Python variables can hold anything

Not like Java, where you have to say what type a variable is (eg. ‘int x;’)

Variables are changeable (mutable)

x = x + 1 makes sense! (x becomes 1 greater than before this)

x += 1 is shorthand for above, also x /= 1, x -=1, x *=1…



I/O

Can display stuff to the user…

print(5) - prints 5 to the screen.

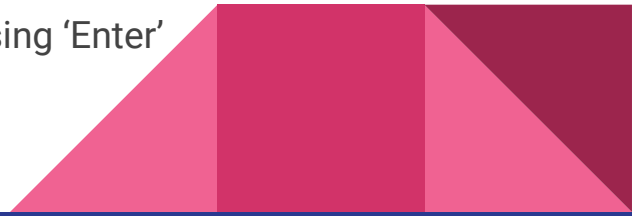
Strings are printed without quotes; each type has its own way of being printed, strings themselves being the most trivial example!

...and ask for things from the user

x = input(“Tell me your name: ”)

Prints prompt, then reads anything user types before pressing ‘Enter’

Read/write files, or indeed any stream

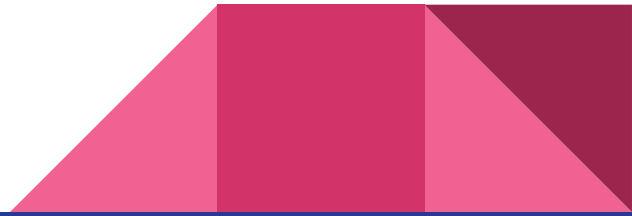


Control Structures

- If blocks are the the most common control structure you will encounter.
- The syntax is as follows:

```
if foo == 3:
        print('Variable foo was 3!')
else:
        print('Variable foo was NOT 3!')
```

- The else clause is optional.



While Loops

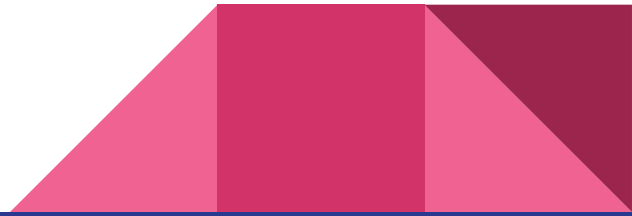
Some things need to be done several times

While loops are if statements on repeat

- If statement runs code if true, while loop keeps running code while condition is true
- Useful to avoid retyping repeated code

Good if you don’t know when your code should stop running

- Eg. Game engine (can’t predict when user shuts down game!)
- Infamous ‘while True:’ loop (what does this do?)



Lists and Indexing

Lists can hold several ordered items

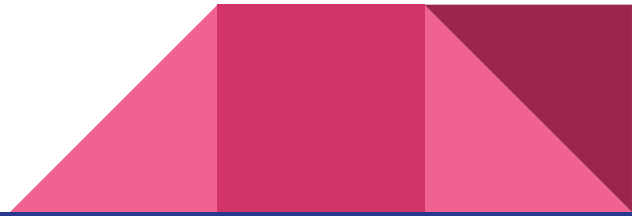
ls = [1, 2, ‘hello’, 3.4] - different types in the list are fine

Lists can be indexed (get element at location)

ls[0] is 1, ls[2] is ‘hello’

Lists are 0-indexed; we count from 0, not 1

Lists of length n have elements 0 through n-1



Splicing and Sorting

Lists can be ‘spliced’ for a sublist

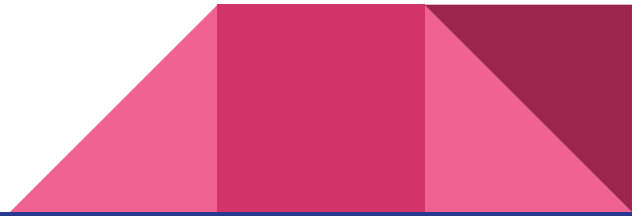
ls[1:3] gives [2, ‘hello’]

First index included, second one not

ls[0:4] is entire list, ls[0:4:2] gives every 2nd item in list, [start:end:jump]

ls[::] is entire list, ls[::-1] is list in reverse! (Why is this?)

Lists can be sorted in place with list_name.sort()



Other Data Structures

Dictionaries let you index things with more than just a number

One example could be using someone's Twitter handle as a key, and a list of their tweets as a value.

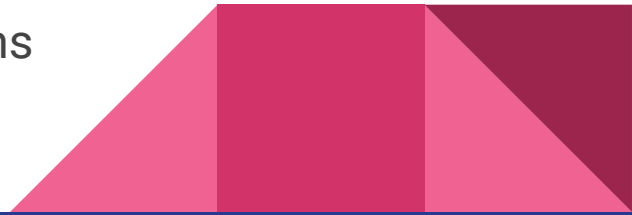
Tuples are similar to lists, but are of immutable size

(1, 2, 'red', True)

Use cases could be a pair of coordinates

Python also supports "set"s for distinct unordered items

Supports set operations such as union and intersection



Course Website

All resources for this course are self-contained within:

https://york.gjcampbell.co.uk/

A direct link to this week's exercises is:

https://york.gjcampbell.co.uk/exercises-1.pdf