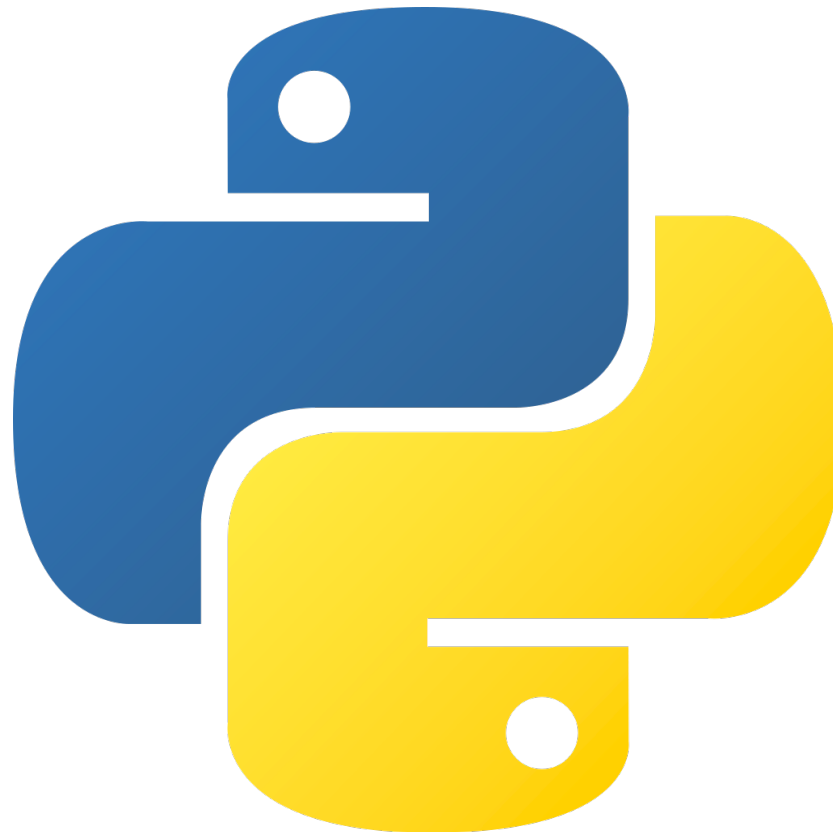


MATH0011: Mathematical Methods II

Part 1: Python Programming

# Week 1: The basics



# Course admin

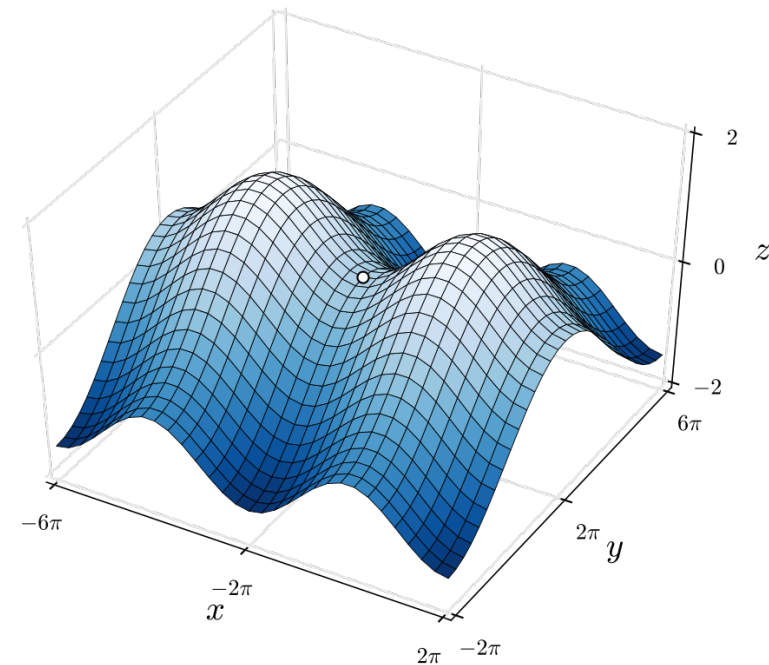
Before reading week:

- Python programming
- Mr Matthew Scroggs  
`matthew.scroggs.14@ucl.ac.uk`



After reading week:

- Multivariable calculus
- Prof Helen Wilson  
`helen.wilson@ucl.ac.uk`



## Before reading week:

- Two hour lecture
  - Tuesdays 11:00–1:00, Christopher Ingold XLG2
- Two hour programming class
  - Tuesday 2:00–4:00, Birkbeck, 414/415
  - \*Tuesday 5:00–7:00, Torrington Place 1-19, 113
  - Wednesday 1:00–3:00, Christopher Ingold, G20
  - Wednesday 3:00–5:00, Christopher Ingold, G20
  - \*Thursday 9:00–11:00, Birkbeck, 109
  - Friday 9:00–11:00, Birkbeck 414/415
  - \* These two are not in the same place every week


## Before reading week:

- Two hour lecture
  - Tuesdays 11:00–1:00, Christopher Ingold XLG2
- Two hour programming class
  - Check your timetable
- Office hours
  - Mondays and Thursdays, 2:00–3:00,  
Maths room 502 (undergrad common room)
- All course material will be available on Moodle and at [www.msccroggs.co.uk/python](http://www.msccroggs.co.uk/python)

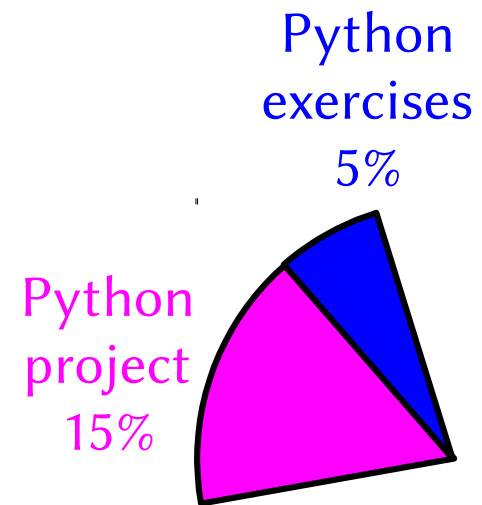
# Course assessment

- 5% Programming exercises
  - To be completed in the weekly programming classes.
  - Each sheet will have one question that you need to get checked by one of the class tutors.
  - If you don't get a problem checked, you can show it to a tutor in the following week's class.

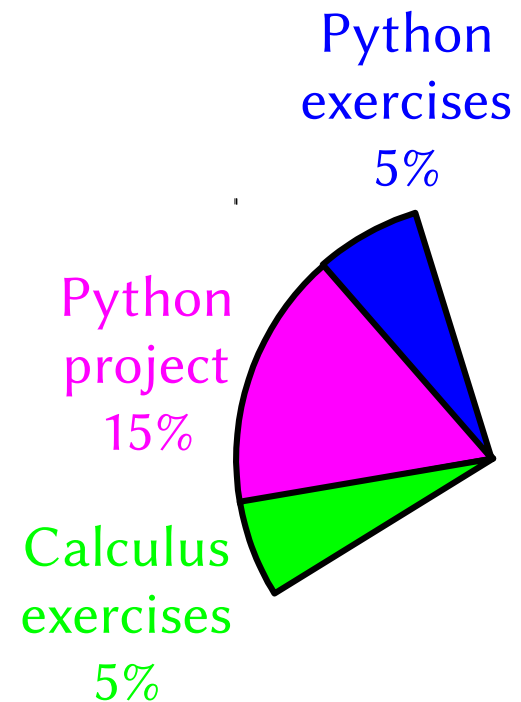
Python  
exercises  
5%



- 15% Programming exercises
  - To be completed in pairs.
  - Will be set before reading week.
  - Due 8 March.

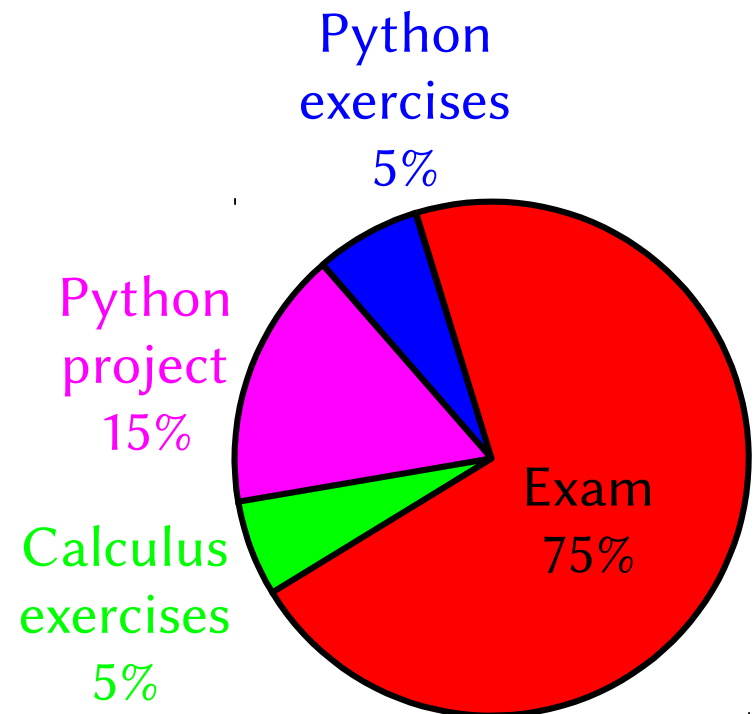


- 5% Calculus homework
  - To be completed in the five weeks after reading week.



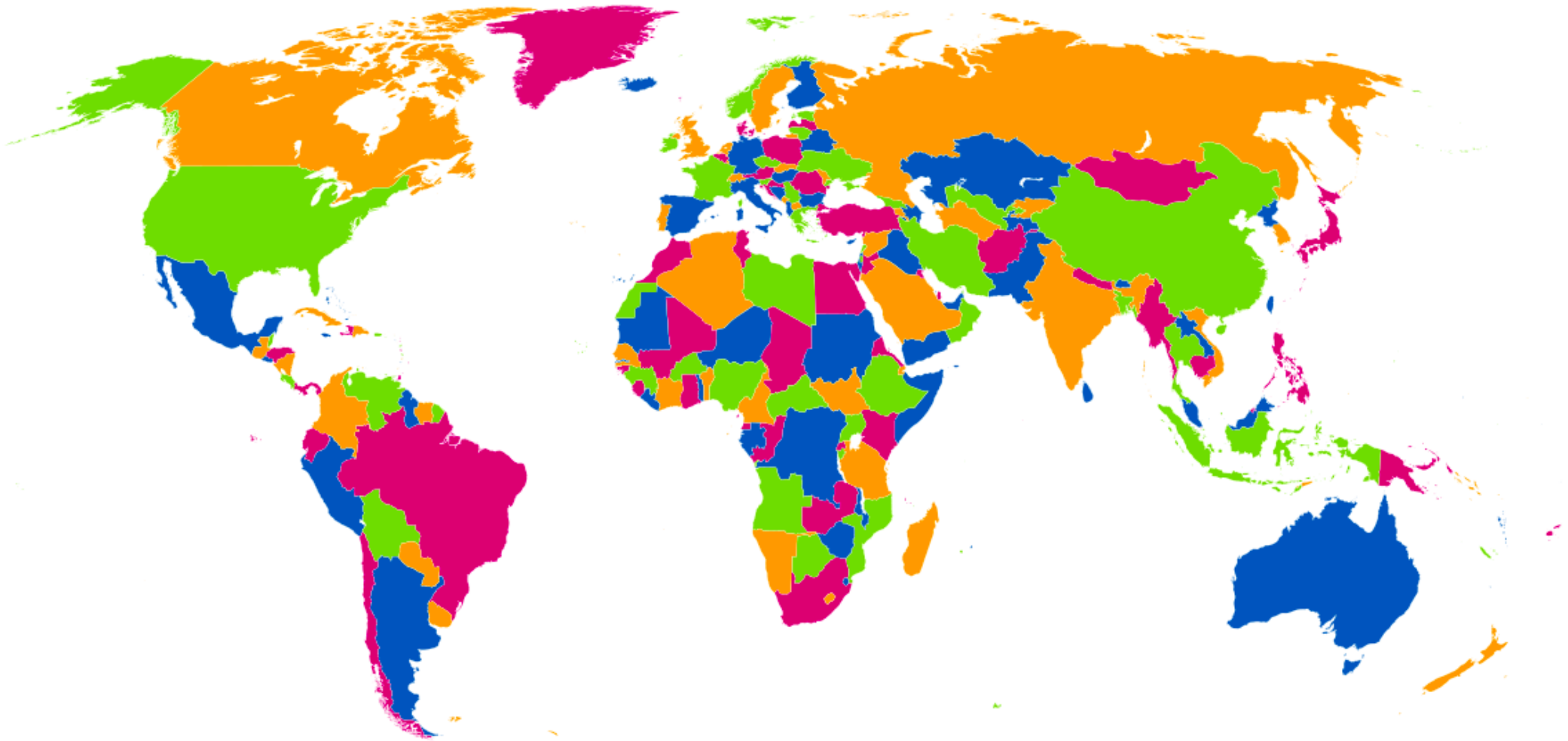
– 75% Exam

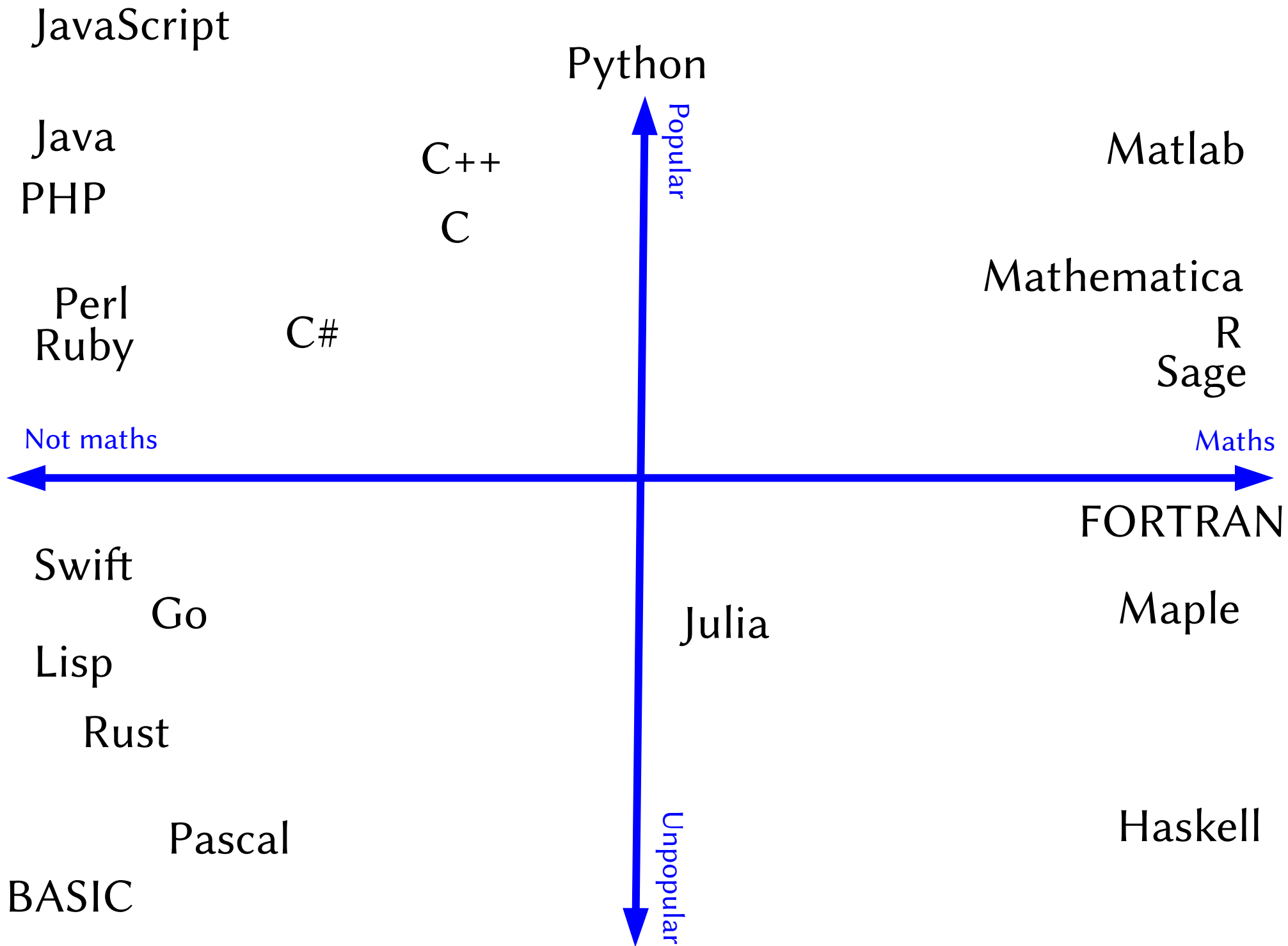
- One compulsory Python question
- Four calculus questions: attempt as many as you like, your best three will count.





# Why learn to program?





# Arithmetic

+	Add
-	Subtract
*	Multiply
/	Divide
**	To the power of
//	Integer division
%	Modulo

# Variables

= Set this equal to

-= Subtract from

+= Add to

\*= Multiply by

etc

# True and False

True

False

First letters are capital

and

or

not

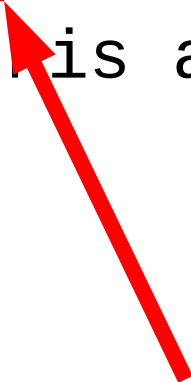
# Important

= Set this equal to

== Check if these are equal

# if

```
if condition:  
    do something  
    do something else  
do this afterwards
```

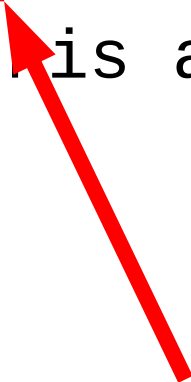


The lines that start with spaces will only be run if condition is True. It is very important that you use the same number of spaces on each line. Four spaces is the most commonly used.

# for

```
for variable in something:
```

```
    do something  
    do something else  
do this afterwards
```



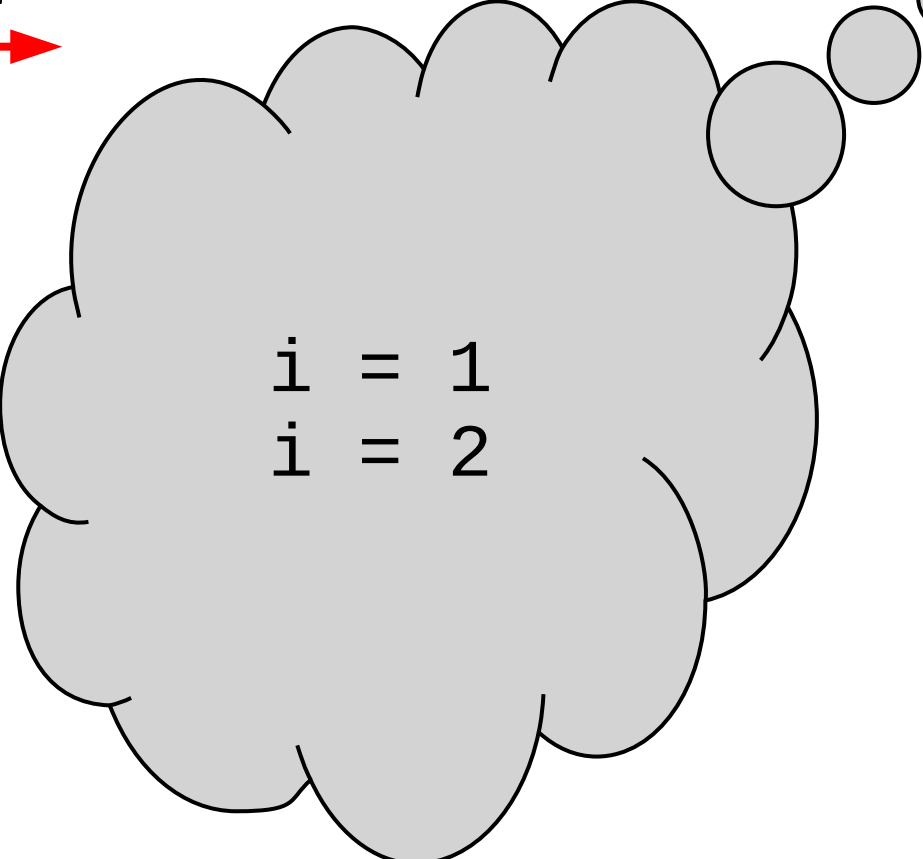
The lines that start with spaces will be run multiple times, with `variable` taking every value in `something`.



# for example

```
→ for i in range(1, 3):  
→     print(i)  
→ print("Done")  
→
```

← range(a, b) is numbers from a to b, including a but not b.



```
i = 1  
i = 2
```



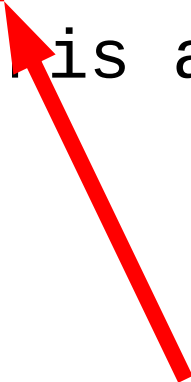
```
1  
2  
Done
```

```
for i in range(1, 21):  
    if i%2 == 0:  
        print(i**2)
```

```
for i in range(1, 21):  
    a = True  
    for j in range(2, i):  
        if i%j == 0:  
            a = False  
    if a:  
        print(i)
```

# while

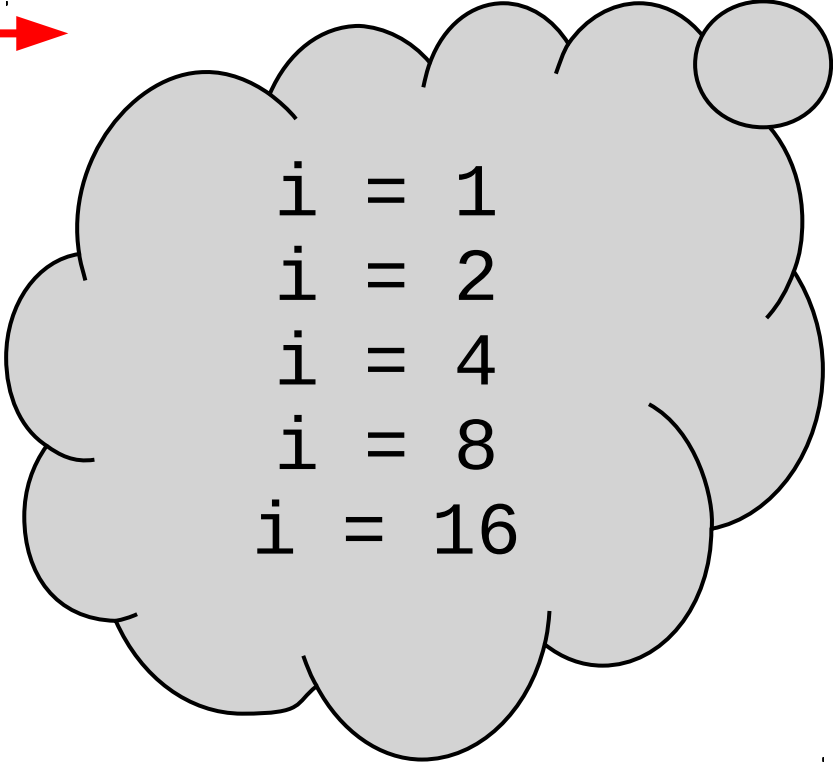
```
while condition:  
    do something  
    do something else  
do this afterwards
```



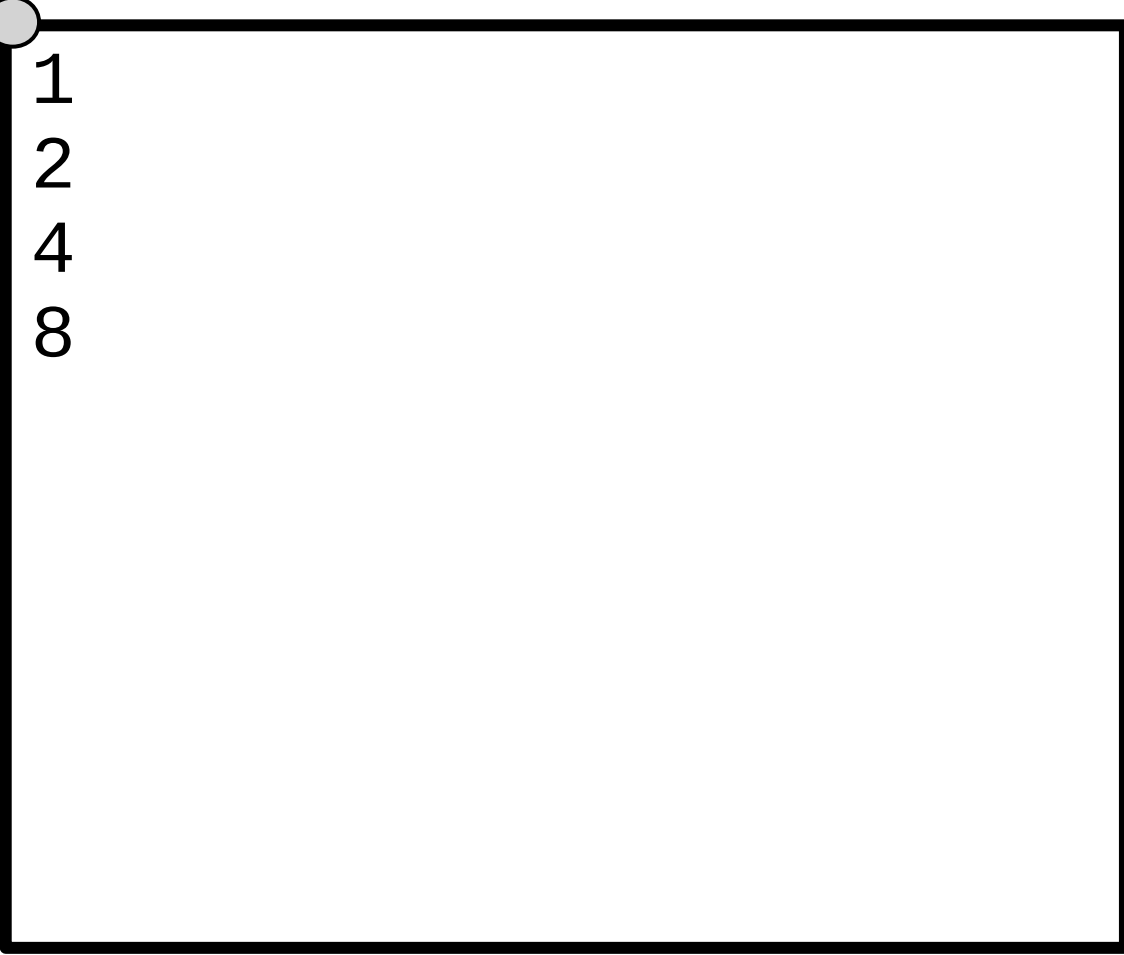
The lines that start with spaces will be run multiple times while condition is True.

# while example

```
→ i = 1  
→ while i < 10:  
→     print(i)  
→     i *= 2
```



```
i = 1  
i = 2  
i = 4  
i = 8  
i = 16
```



```
1  
2  
4  
8
```

```
i = 1
while i < 21:
    if i%2 == 0:
        print(i**2)
    i += 1
```

```
tot = 0
i = 1
while tot < 100:
    tot += i
    i += 1
print(i)
print(tot)
```

# Example

Print Fibonacci numbers up to 1000

1, 1, 2, 3, 5, 8, 13, 21, ...



# In programming classes...

- Download question sheet from Moodle or [www.msccroggs.co.uk/python](http://www.msccroggs.co.uk/python)
- Work through the questions in the notes.
- Work through the “Putting it all together” questions.
- Complete the “Assessed question” and show your solution to one of the class tutors.