Welcome to the introduction to computational cognitive modelling workshop!

Part 1: Introduction to Python

Part 1: **Introduction to Python**

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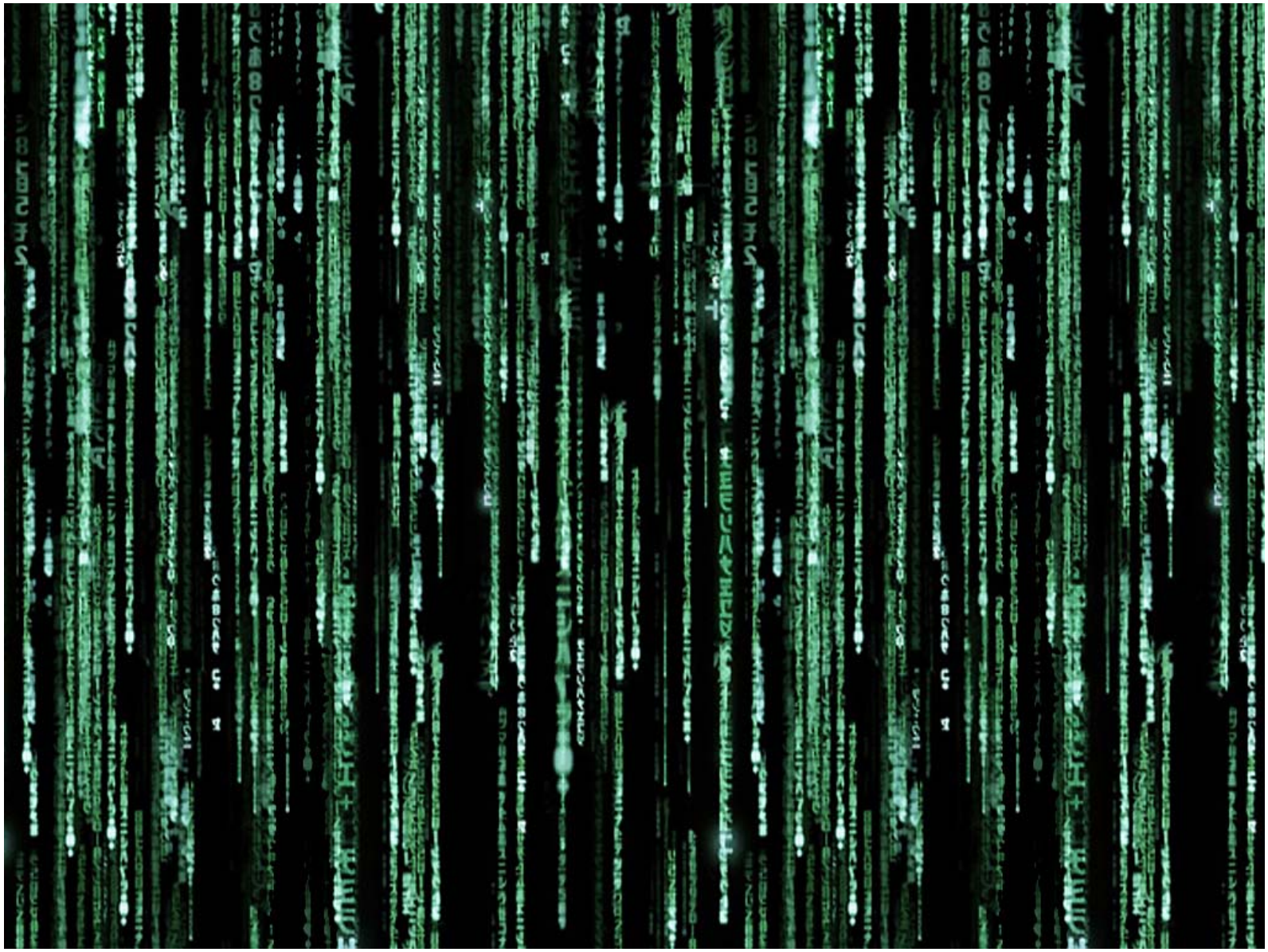
What is programming?



It is like use using any other language!

- Programming = telling a computer what to do

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- Programming = telling a computer what to do
- You write the recipe, the computer follows it

It is like use using any other language!

- Programming = telling a computer what to do
- You write the recipe, the computer follows it
- Programming is an art, a craft, or a type of engineering.

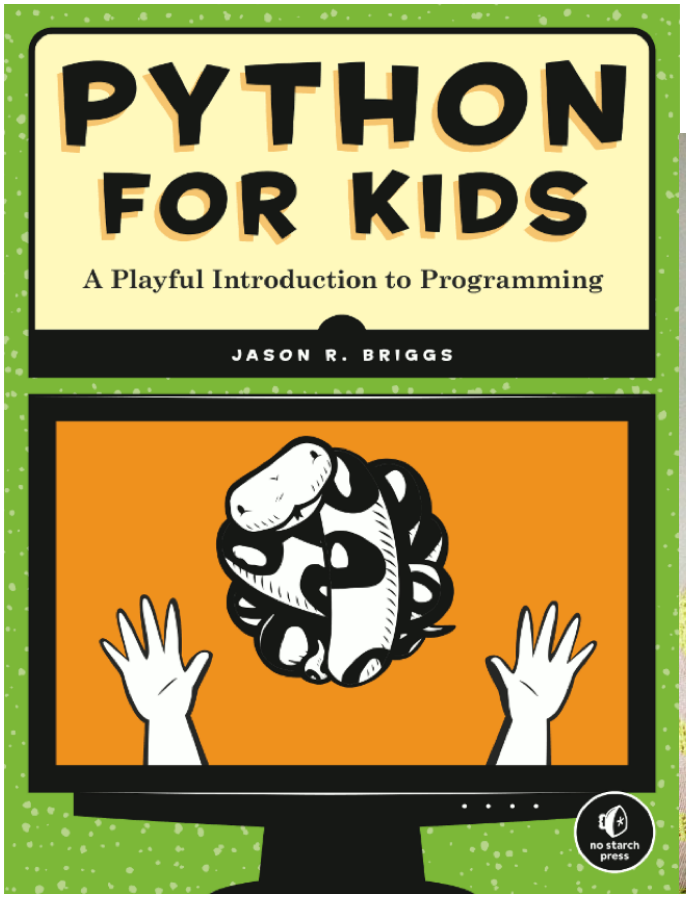
Who is a programmer?

Who is a programmer?

Ada Lovelace, Grace Hopper, Amanda Spann, etc.

Who is a programmer?

Children!



Maddy Petrovich, 14, of Wellesley, Mass. first started learning how to use the programming language Scratch when she was 10 years old.
http://hereandnow.wbur.org/2012/12/26/computer-programming-kids

Who is a programmer?

You! Seriously

- **Anybody can program**

Who is a programmer?

You! Seriously

- **Anybody can program**
- But not everybody is Maya Angelou or Jane Austen!

Who is a programmer?

You! Seriously

- **Anybody can program**
- But not everybody is Maya Angelou or Jane Austen!
- But who cares? We can still communicate! We can still code!

Why program?

Why speak or write?

- Communicate ideas unambiguously

Why program?

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- Allow your ideas to “live” on their own

Why program?

Why speak or write?

- Communicate ideas unambiguously
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- It is actually fun and definitely addictive

Why program?

Why speak or write?

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- Allow your ideas to “live” on their own
- It is actually fun and definitely addictive
- Save time by automating repetitive tasks

Why program?

Why speak or write?

- Communicate ideas unambiguously
- Allow your ideas to “live” on their own
- It is actually fun and definitely addictive
- Save time by automating repetitive tasks
- All the cool kids are doing it

What is Python?

Will it eat my mouse?

What is Python?

Not John Cleese, but closer...

What is Python?

Not a snake

- Named after Monty Python

What is Python?

Not a snake

- Named after Monty Python
- A programming language

What is Python?

Not a snake

- Named after Monty Python
- A programming language
- Not scary

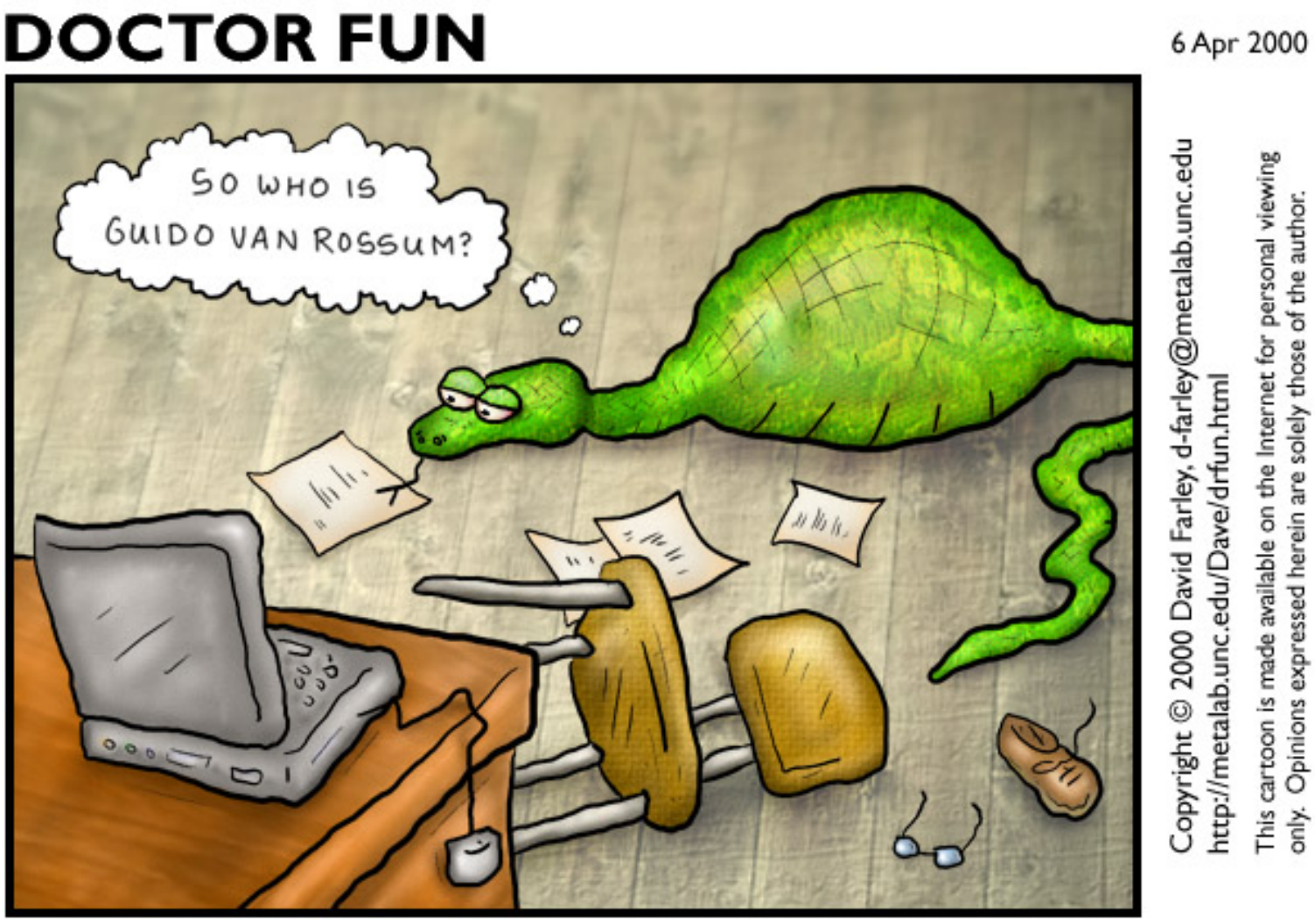
What is Python?

Not a snake

- Named after Monty Python
- A programming language
- Not scary
- Cool

Who created Python?

A Dutch human



Who created Python?

Guido van Rossum

aka Benevolent Dictator For Life

Why use Python?

It was created for you

- Easy and intuitive

Why use Python?

It was created for you

- Easy and intuitive
- Open source and free

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- Lots of help online

Why use Python?

It was created for you

- Easy and intuitive
- Open source and free
- Close to plain English
- Lots of help online
- Even geeks like it

Time to get serious!

Open up Python

Assignment

Put a value into a variable

- Symbol in Python: =
- Does **not** mean equals!

Python shell:

Assignment

Put a value into a variable

- Symbol in Python: =
- Does **not** mean equals!
- Make the variable have the value
- Read as “assign”, “make”, or “equals”

Python shell:

```
>>> i = 5
>>> print i
```

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Python shell:

```
>>> i = 5
>>> print i
5
>>> i + 2
```

Assignment

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Python shell:

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5
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7
```

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5
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7
>>> i = i + 1
>>> print i
```

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Python shell:

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>>> i = 5
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5
>>> i + 2
7
>>> i = i + 1
>>> print i
6
```

Assignment

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Python shell:

```
>>> i = 5
>>> print i
5
>>> i + 2
7
>>> i = i + 1
>>> print i
6
>>> i += 0.8
```

Assignment

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>>> print i
6
>>> i += 0.8
7.8
```

Basic maths

Arithmetic is fun when you don't have to do it manually!

- Use Python as a calculator
- Assign results into variables
- All your favourites like plus, minus, times, divided by, etc.

Python shell:

```
>>> (41 + 45.87) / 2
```

Basic maths

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>>> 5**2
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```
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25
```

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```
>>> (41 + 45.87) / 2
43.435
>>> 5**2
25
>>> a = 8
>>> b = a / 2
>>> c = b**2
```

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>>> print a, b, c
```

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>>> (41 + 45.87) / 2
43.435
>>> 5**2
25
>>> a = 8
>>> b = a / 2
>>> c = b**2
>>> print a, b, c
8 4 6
```

Truth values

Perfectly logical

- == equality
- != inequality
- >=, >, <=, <
- and, or, not

Python shell:

```
>>> True and False
False
```

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Python shell:

```
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Python shell:

```
>>> True and False
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>>> True or False
True
>>> not False
```

Truth values

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Python shell:

```
>>> True and False
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>>> True or False
True
>>> not False
True
>>> 100 == True
```

Truth values

Perfectly logical

- == equality
- != inequality
- >=, >, <=, <
- and, or, not

Python shell:

```
>>> True and False
False
>>> True or False
True
>>> not False
True
>>> 100 == True
False
```

Truth values

Perfectly logical

- == equality
- != inequality
- >=, >, <=, <
- and, or, not

Python shell:

```
>>> True and False
False
>>> True or False
True
>>> not False
True
>>> 100 == True
False
>>> a != b
```

Truth values

Perfectly logical

- == equality
- != inequality
- >=, >, <=, <
- and, or, not

Python shell:

```
>>> True and False
False
>>> True or False
True
>>> not False
True
>>> 100 == True
False
>>> a != b
True
```

Time to get SUPER serious!

Open a text editor

Syntax

Tabs and spaces

- Syntax is important
- Very important

```
a = 2
b = 8
if a == b:

  print "equal"
elif a > b:

  print "a is bigger"
else:

  print "b is bigger"
...
```

Syntax

Tabs and spaces

- Syntax is important
- Very important
- Comments also

```
a = 2
b = 8
if a == b:
# This is a comment!
  print "equal"
elif a > b:
# Python ignores me!
  print "a is bigger"
else:
# But you see me!
  print "b is bigger"
...
```

Conditional statements

If, then, else

- If X is the case, then do Y

```
a = 2
b = 8
if a == b:
 #a and b the same
 print "equal"
```

Conditional statements

If, then, else

- If X is the case, then do Y

```
a = 2
b = 8
if a == b:
 #a and b the same
 print "equal"



else:
 #a smaller than b
 print "b is bigger"
```

- otherwise do Z

Conditional statements

If, then, else

- If X is the case, then do Y
- but if A is the case, do B
- but if C is the case, do D
- ...
- otherwise do Z

```
a = 2
b = 8
if a == b:
 #a and b the same
 print "equal"
elif a > b:
 #b smaller than a
 print "a is bigger"
else:
 #a smaller than b
 print "b is bigger"
```

For loops

What sorcery is this?

- Do something

Text editor:

```
print 1
```

Python output:

For loops

What sorcery is this?

- Do something
- do something

Text editor:

```
print 1
print 2
```

Python output:

For loops

What sorcery is this?

- Do something
- do something
- do something

Text editor:

```
print 1
print 2
print 3
```

Python output:

For loops

What sorcery is this?

- Do something
- do something
- do something
- do something

Text editor:

```
print 1
print 2
print 3
print 4
```

Python output:

For loops

What sorcery is this?

- Do something
- do something
- do something
- do something
- do something

Text editor:

```
print 1
print 2
print 3
print 4
print 5
```

Python output:

For loops

What sorcery is this?

- Do something
- do something
- do something
- do something
- do something

Text editor:

```
print 1
print 2
print 3
print 4
print 5
```

Python output:

```
1
2
3
4
5
```

For loops

What sorcery is this?

- Use a single command!
- Do something five times

Text editor:

```
for i in          (1,6):
  print i
```

Python output:

For loops

What sorcery is this?

- Use a single command!
- Do something five times

Text editor:

```
for i in          (1,6):
  print i
```

Python output:

```
1
2
3
4
5
```

While loops

More magic!

- For loop: for each of the 5 slices of pizza, eat them

While loops

More magic!

- For loop: for each of the 5 slices of pizza, eat them
- What if you don't know how many times you want to do something?

While loops

More magic!

- For loop: for each of the 5 slices of pizza, eat them
- What if you don't know how many times you want to do something?
- Do something *until* something else happens

While loops

More magic!

- For loop: for each of the 5 slices of pizza, eat them
- What if you don't know how many times you want to do something?
- Do something *until* something else happens
- While loop: while it's raining, use umbrella

While loops

More magic!

- For loop: for each of the 5 slices of pizza, eat them
- What if you don't know how many times you want to do something?
- Do something *until* something else happens
- While loop: while it's raining, use umbrella
- While there are slices of pizza, eat them

While loops

More magic!

Text editor:

```
while True:
```

Python output:

While loops

More magic!

Text editor:

```
while True:
    n =              ("Please enter 'hello':")
```

Python output:

While loops

More magic!

Text editor:

```
while True:
    n =             ("Please enter 'hello':")
    if n == 'hello':
```

Python output:

While loops

More magic!

Text editor:

```
while True:
    n =             ("Please enter 'hello':")
    if n == 'hello':
        break
```

Python output:

While loops

More magic!

Text editor:

```
while True:
    n =             ("Please enter 'hello':")
    if n == 'hello':
        break
```

Python output:

```
Please enter 'hello':no
```

While loops

More magic!

Text editor:

```
while True:
    n =             ("Please enter 'hello':")
    if n == 'hello':
        break
```

Python output:

```
Please enter 'hello':no
Please enter 'hello':never
```

While loops

More magic!

Text editor:

```
while True:
    n =             ("Please enter 'hello':")
    if n == 'hello':
        break
```

Python output:

```
Please enter 'hello':no
Please enter 'hello':never
Please enter 'hello':hi?
```

While loops

More magic!

Text editor:

```
while True:
    n =             ("Please enter 'hello':")
    if n == 'hello':
        break
```

Python output:

```
Please enter 'hello':no
Please enter 'hello':never
Please enter 'hello':hi?
Please enter 'hello':hello
```

While loops

More magic!

Text editor:

```
while True:
    n =             ("Please enter 'hello':")
    if n == 'hello':
        break
```

Python output:

```
Please enter 'hello':no
Please enter 'hello':never
Please enter 'hello':hi?
Please enter 'hello':hello
>>>
```

Exercises

Do them!

Put your hand up if you need help!