Guess Who!

Welcome to the labs!

Thank you to our Sponsors!

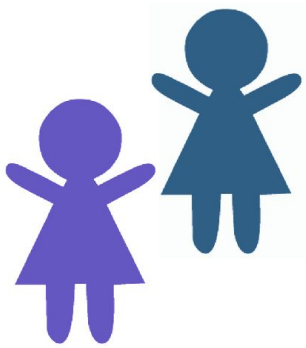
Platinum Sponsor:

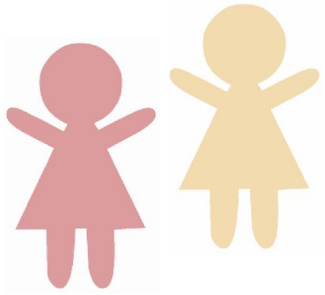
Who are the tutors?

Who are you?

Introduce your partner

1. Find a partner (someone you've never met before)
2. Find out:
   a. Their name
   b. What (school) year they are in
   c. A fun fact about them!
3. Introduce them to the rest of the group!





Log on

Jump on the GPN website

girlsprogramming.network/workshop

You can see:

- These **slides** (to take a look back or go on ahead).
- A digital copy of your **workbook**.
- Help bits of text you can **copy and paste**!

There's also links to places where you can do more programming!

Tell us you're here!

Click on the
Start of Day Survey
and fill it in now!

Today’s project!

Guess Who?

Using the workbook!

The workbooks will help you put your project together!

Each **Part** of the workbook is made of tasks!

Tasks - The parts of your project

Follow the tasks **in order** to make the project!

Hints - Helpers for your tasks!

Stuck on a task, we might have given you a hint to help you **figure it out**!

The hints have **unrelated** examples, or tips. **Don't copy and paste** in the code, you'll end up with something **CRAZY**!

Task 6.2: Add a blah to your code!

This has instructions on how to do a part of the project

1. **Start by doing this part**
2. **Then you can do this part**

Task 6.1: Make the thing do blah!

Make your project do blah ….

Hint

A clue, an example or some extra information to help you **figure out** the answer.

```
print('This example is not part of the project' )
```

Using the workbook!

The workbooks will help you put your project together!

Check off before you move on from a **Part**! Do some bonuses while you wait!

Checklist - Am I done yet?

Make sure you can tick off every box in this section before you go to the next Part.

Lecture Markers
This tells you you'll find out how to do things for this section during the names lecture.

Bonus Activities
Stuck waiting at a lecture marker?
Try a purple bonus. They add extra functionality to your project along the way.

☑ **CHECKPOINT** ☑

If you can tick all of these off you're ready to move the next part!
☐ Your program does blah
☐ Your program does blob

★ **BONUS 4.3: Do some extra!**

Something to try if you have spare time before the next lecture!

Intro to Programming

What is programming?

Programming is not a bunch of crazy numbers!

It's giving computers a set of instructions!

A Special Language

A language to talk to dogs!

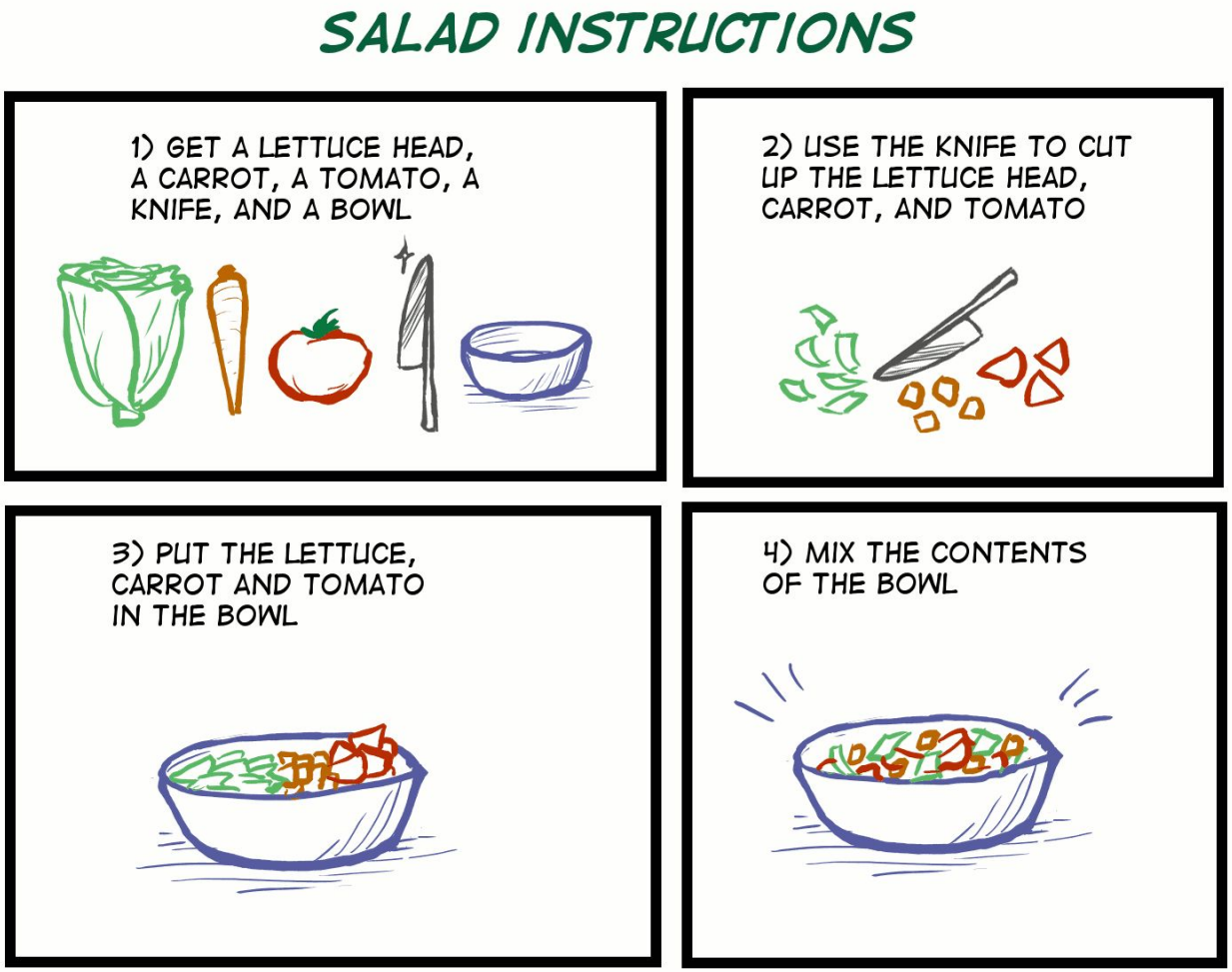
Programming is a language to talk to computers

People are smart! Computers are dumb!

Programming is like a recipe!

Computers do EXACTLY what you say, every time.

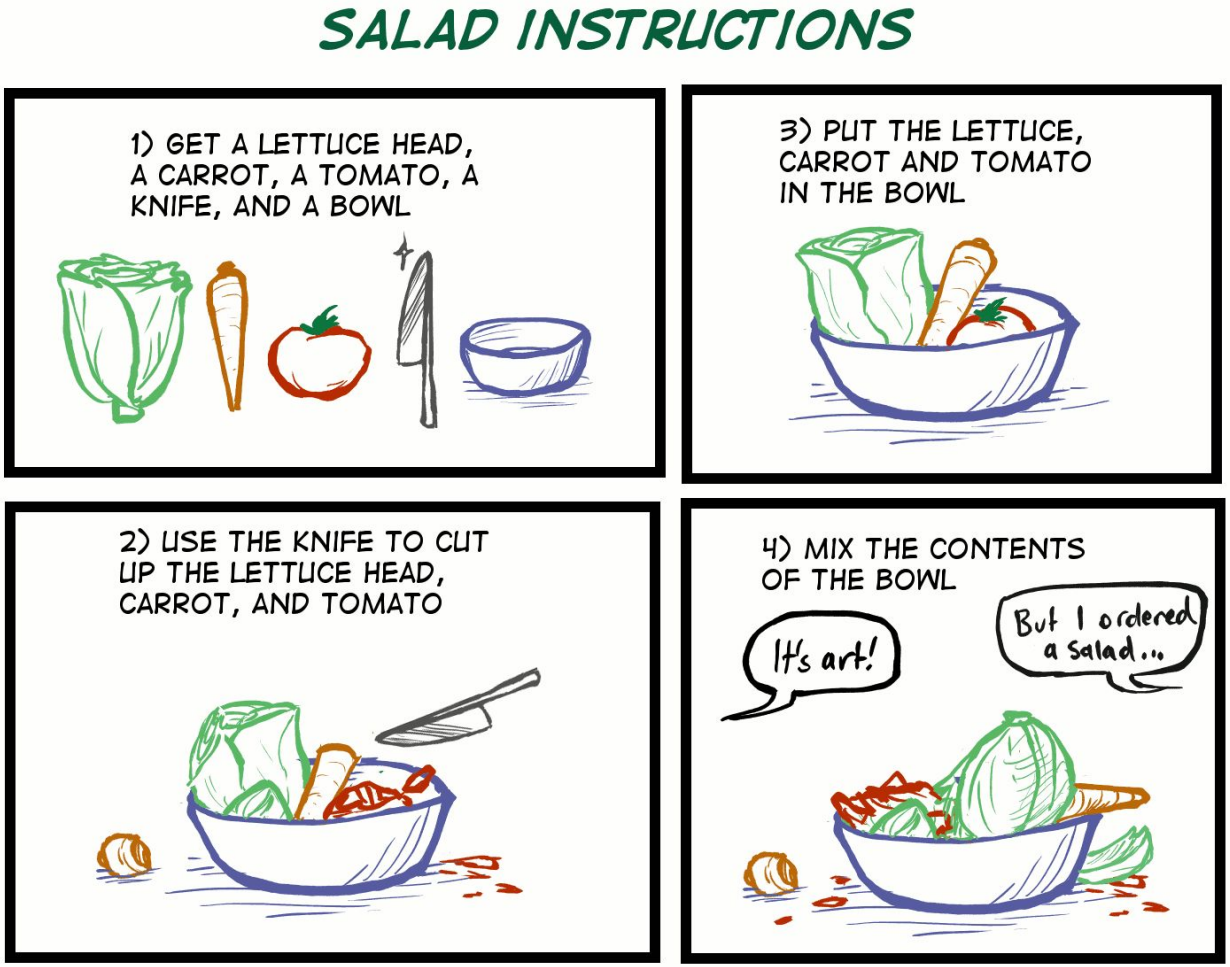
Which is great if you give them a good recipe!



People are smart! Computers are dumb!

But if you get it out of order….

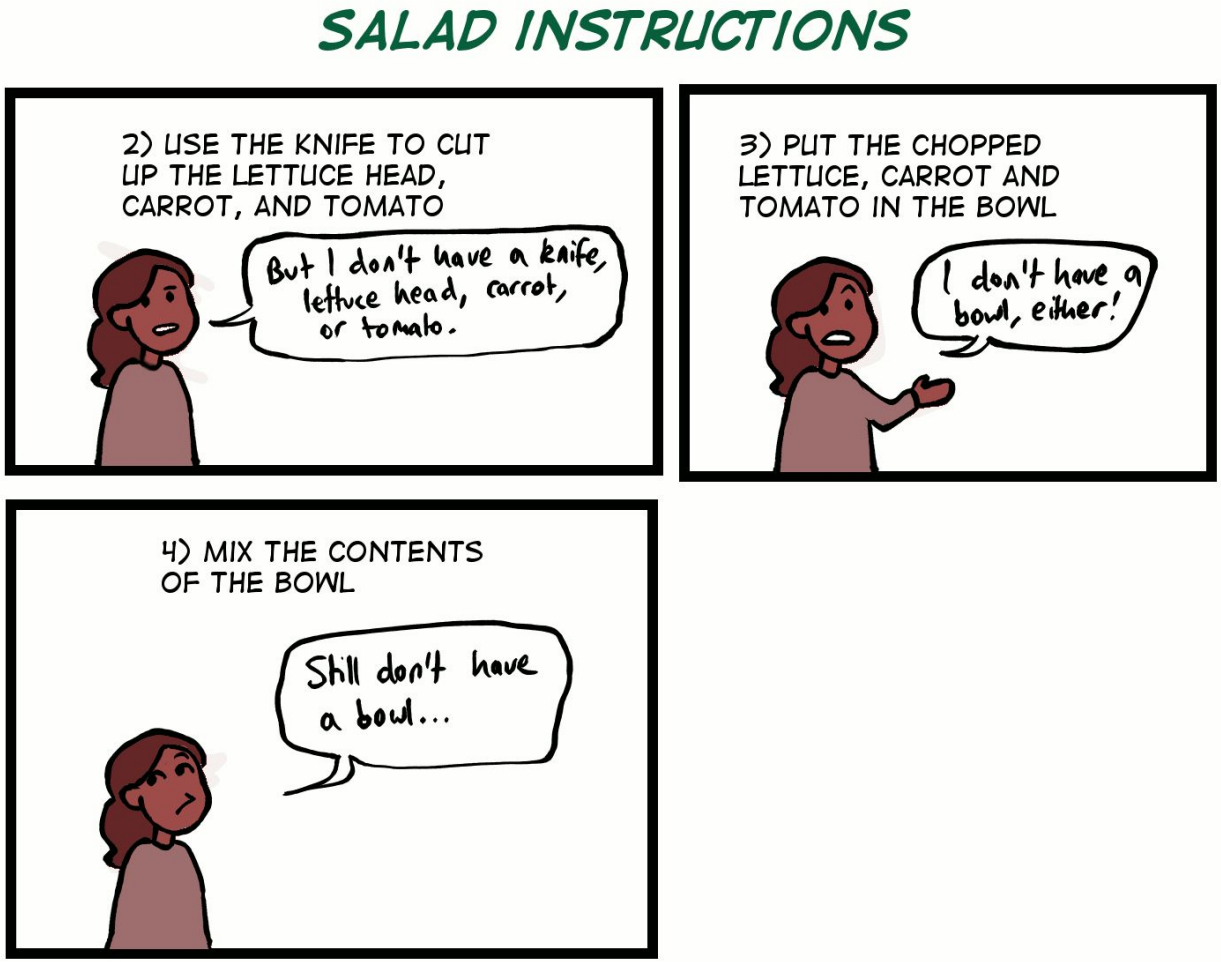
A computer wouldn't know this recipe was wrong!



People are smart! Computers are dumb!

Computers are bad at filling in the gaps!

A computer wouldn't know something was missing, it would just freak out!



Everyone/thing has strengths!

- Understand instructions despite:
  - Spelling mistakes
  - Typos
  - Confusing parts
- Solve problems
- Tell computers what to do
- Get smarter every day

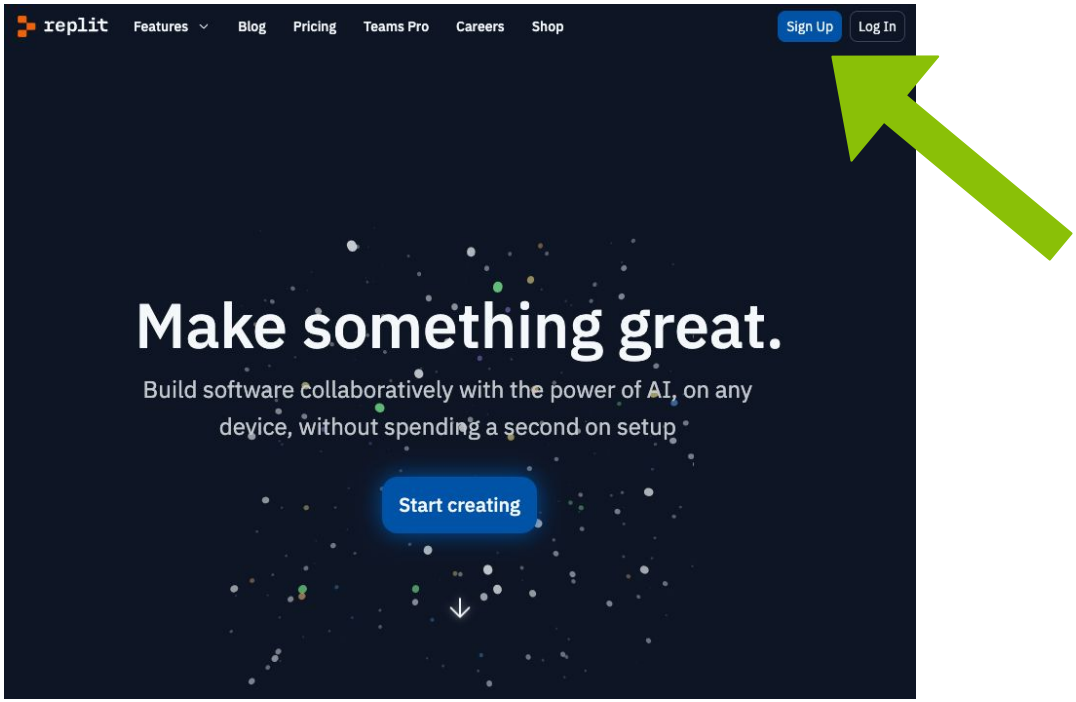
- Does exactly what you tell it
- Does it the same every time
- Doesn't need to sleep!
- Will work for hours on end!
- Get smarter when you tell them how

Intro to Python

Let’s get coding!

Where do we program?

We'll use ***Repl It*** to make a Python project!



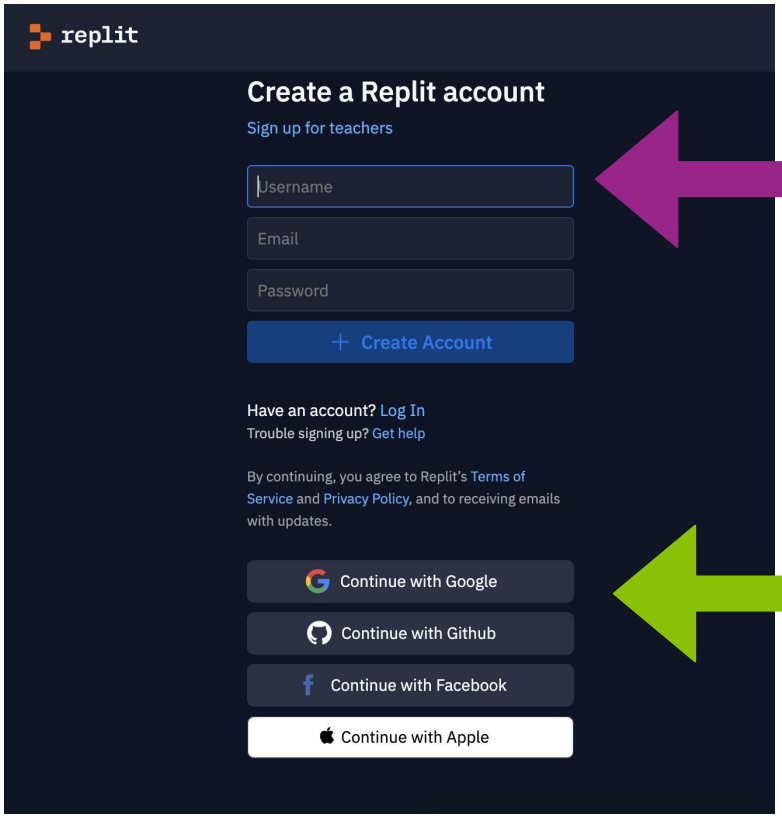
Go to replit.com in Google Chrome

Where do we program?

You need to sign up or sign in to start coding

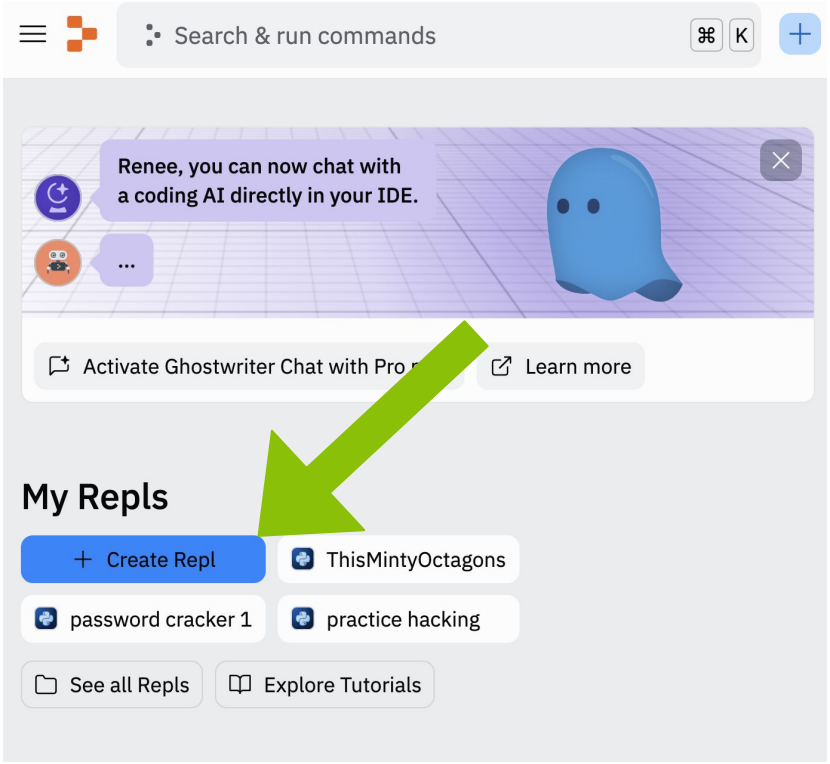
If you have a **Google** or **Apple account** it's easiest to use that.

Or use an **email address** you are able to log into.

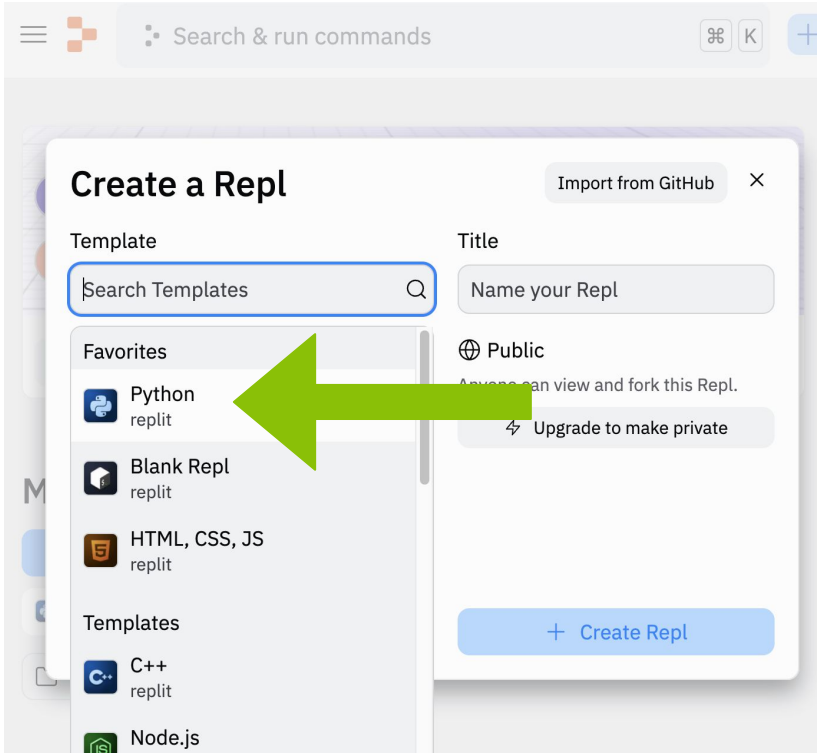


Creating our **Repl It Project**

Let's create a new project



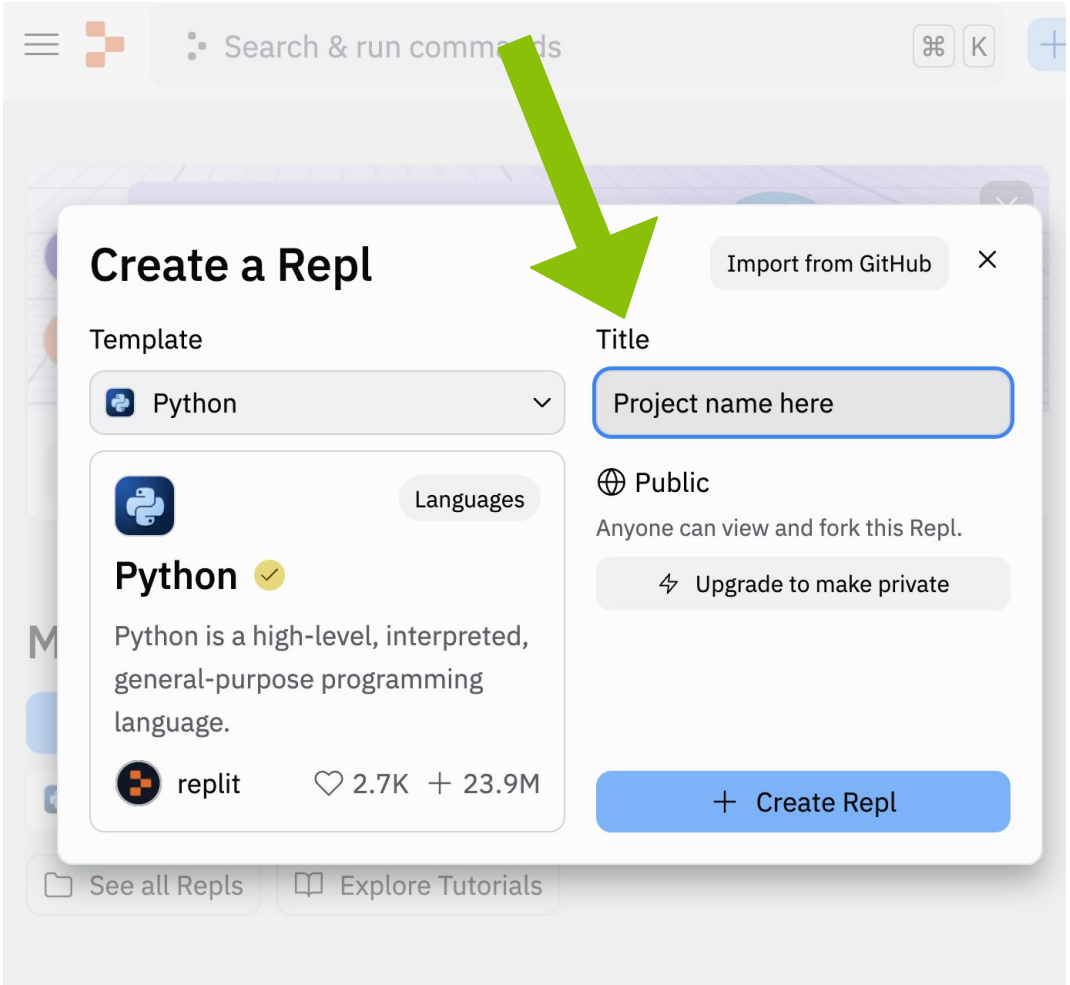
Select Python for the project template



Creating our **Repl It Project**

Don’t forget to give your project a name!

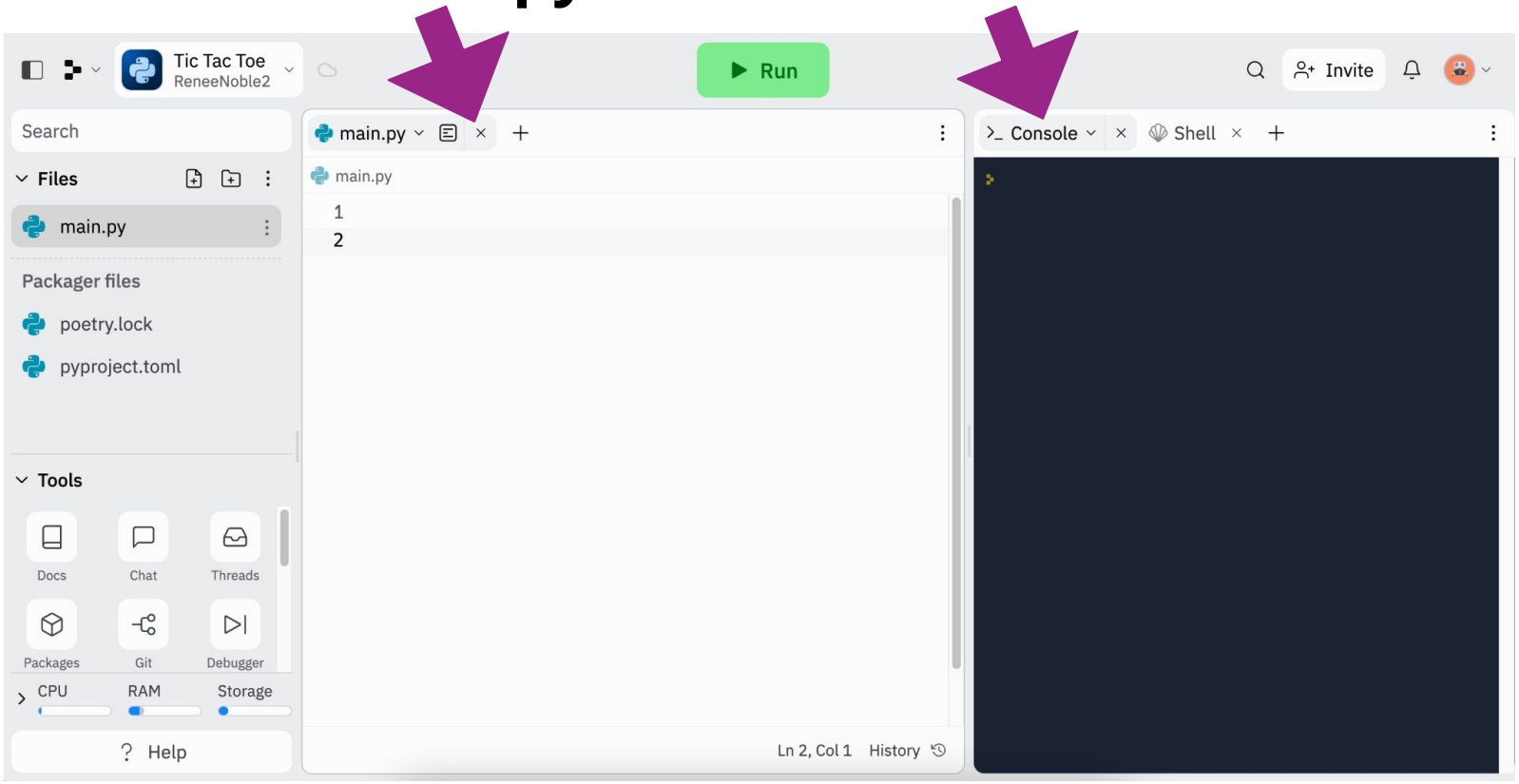
Name it after today’s project!



We're ready to code!

We'll write our project here in main.py

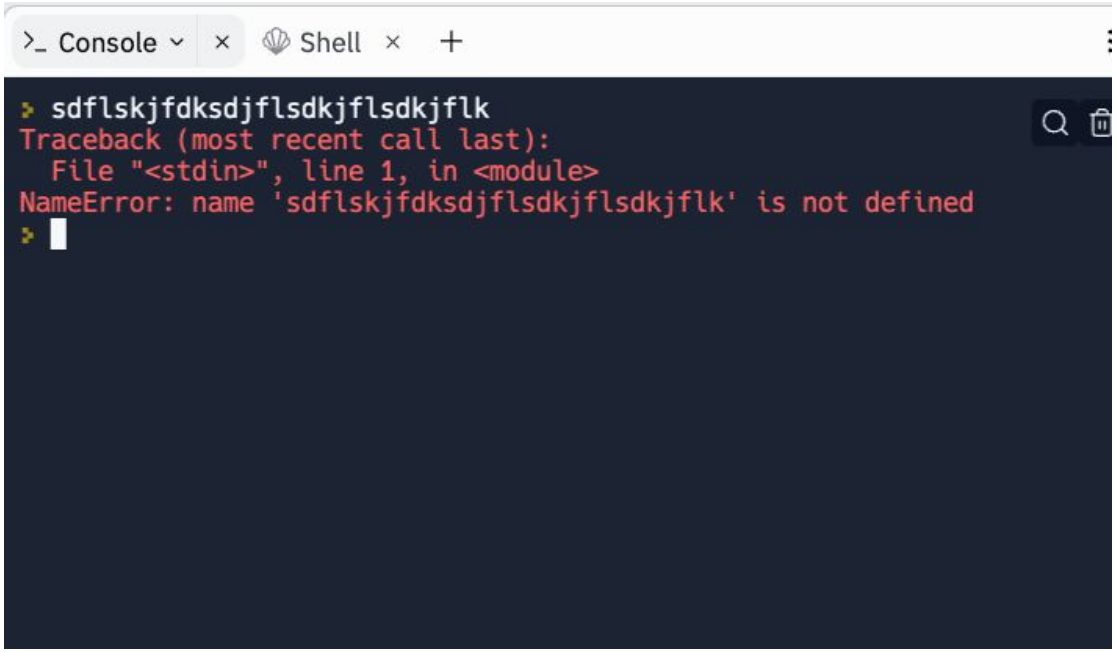
You can test out Python code in the console



Test the **console**! Make a mistake!

Type by **button mashing** the keyboard!

Then press enter!



Did you get a big red error message?

Mistakes are great!

SyntaxError: Invalid Syntax

Good work you made an error!

ImportError: No module named humour

- Programmers make A LOT of errors!
- Errors give us hints to find mistakes
- Run your code often to get the hints!!
- Mistakes won't break computers!

KeyError: 'Hairy Potter'

```
AttributeError:
'NoneType' object
has no attribute
'foo'
```

```
TypeError: Can't
convert 'int' object
to str implicitly
```

We can learn from our mistakes!

Error messages help us fix our mistakes!

We read error messages from bottom to top

```
Traceback (most recent call last):
  File "C:/Users/Madeleine/Desktop/tmp.py", line 9, in <module>
    print("I have " + 5 + " apples")
TypeError: can only concatenate str (not "int") to str
```

3. Where that code is

1. What went wrong

2. What code didn't work

Adding a comment!

Sometimes we want to write things in our file that the computer doesn't look at. We can use **comments** for that!

Sometimes we want to write a note for a people to read

```
# This code was written by Vivian
```

And sometimes we want to not run some code (but don't want to delete it!)

```
# print("Goodbye world!")
```

Write some code!!

Watch a Tutor type this into the window

Then press enter!

```
print('hello world')
```

Did it print:

```
hello world
```

???

Tell me more!

We can `print` things in lots of different ways in python!

```
>>> print("Hello world!")

>>> print("Hello", "world!")

>>> print("Hello", "world", end="!")
```

Tell me more!

We can `print` things in lots of different ways in python!

```
>>> print("Hello world!")
Hello world!
>>> print("Hello", "world!")

>>> print("Hello", "world", end="!")
```

Tell me more!

We can `print` things in lots of different ways in python!

```
>>> print("Hello world!")
Hello world!
>>> print("Hello", "world!")
Hello world!
>>> print("Hello", "world", end="!")
```

Tell me more!

We can `print` things in lots of different ways in python!

```
>>> print("Hello world!")
Hello world!
>>> print("Hello", "world!")
Hello world!
>>> print("Hello", "world", end="!")
Hello world!
```

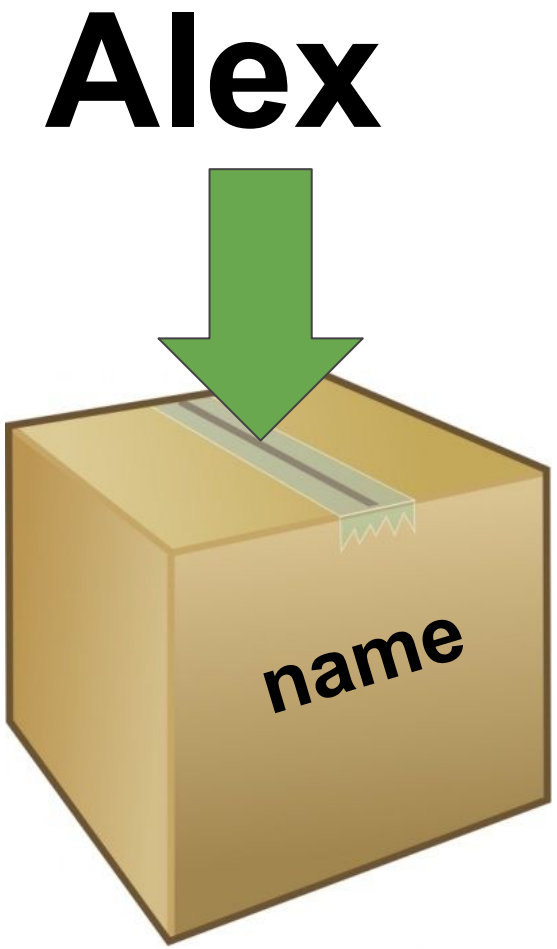
Note that this last one will not have a new line after it!

Variables

Variables are useful for storing things that change

(i.e. things that "vary" - hence the word "variable")

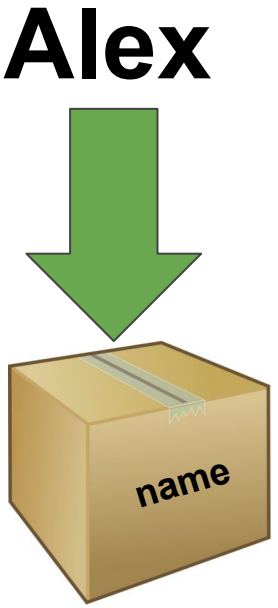
You can think of it like putting information in a box and giving it a name



Variables

Instead of writing a name, we can use the name that is inside our variable! Here, we get the name out of the box.

```
print(name)
```

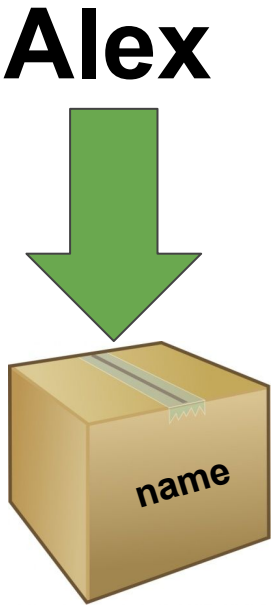


Variables

Instead of writing a name, we can use the name that is inside our variable! Here, we get the name out of the box.

```
print(name)
```

```
Alex
```



Reusing variables

We can replace values in variables:

```
animal = "dog"
print("My favourite animal is a " + animal)
animal = "cat"
print("My favourite animal is a " + animal)
animal = animal + "dog"
print("My favourite animal is a " + animal)
```

What will this output?

Reusing variables

We can replace values in variables:

```
animal = "dog"
print("My favourite animal is a " + animal)
animal = "cat"
print("My favourite animal is a " + animal)
animal = animal + "dog"
print("My favourite animal is a " + animal)
```

What will this output?

```
My favourite animal is a dog
My favourite animal is a cat
My favourite animal is a catdog
```

Asking a question!

It's more fun when we get to interact with the computer!

Let's get the computer to ask us a question!

```
my_name = input('What is your name? ')
print('Hello ' + my_name)
```

What do you think happens?

Asking a question!

It's more fun when we get to interact with the computer!

Let's get the computer to ask us a question!

```
my_name = input('What is your name? ')
print('Hello ' + my_name)
```

What do you think happens?

```
What is your name? Maddie
Hello Maddie
```

Asking a question!

Store the answer in the variable my_name

Writing input tells the computer to wait for a response

This is the question you want printed to the screen

```
my_name = input('What is your name? ')
print('Hello ' + my_name)
```

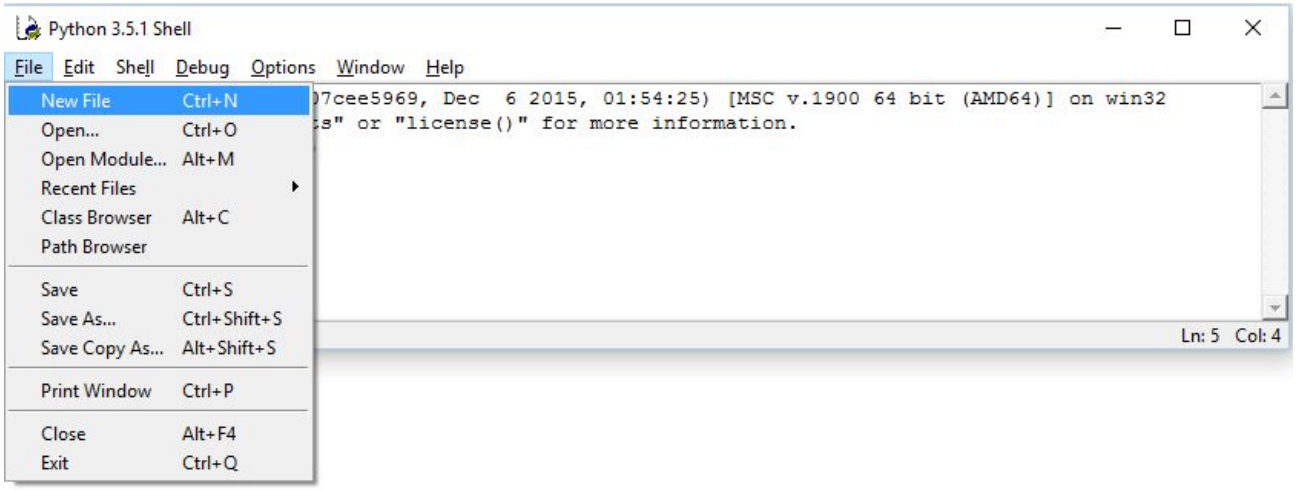
What do you think happens?

```
What is your name? Maddie
Hello Maddie
```

We can use the answer the user wrote that we then stored later!

Coding in a file!

Part 0 of your workbook is to create a new file. This is a picture of how to do it in IDLE



Name your file **markov_chains.py**

Adding a comment!

Sometimes we want to write things in code that the computer doesn't look at! We use **comments** for that!

Use comments to write a note or explanation of our code

Comments make code easier for humans to understand

```
# This code was written by Sheree
```

We can make code into a comment if we don't want it to run (but don't want to delete it!)

```
# print("Goodbye world!")
```

Project time!

You now know all about printing, variables and input!

Let’s put what we learnt into our project

Try to do Part 0 - Part 1

The tutors will be around to help!

Lists

Storing groups of things in variables

- We know how to store individual things, but if we have a group of things?
- We can try to do this with variables

```
>>> day1 = 'Monday'
>>> day2 = 'Tuesday'
>>> day3 = 'Wednesday'
>>> day4 = 'Thursday'
>>> day5 = 'Friday'
>>> day6 = 'Saturday'
>>> day7 = 'Sunday'
```

- But this can get long and hard to deal with *really* quickly...

Lists can store multiple things

- It's better to create a `list`. A `list` is a data type, like `int`eger and `str`ing, but cooler!

- A `list` is an ordered group of related items, all in the same variable

- So instead of using 7 variables to store the days, we can use one:

```
>>> days = ['Monday', 'Tuesday',
'Wednesday', 'Thursday', 'Friday',
'Saturday', 'Sunday']
```

Creating lists

- A `list` is created using square brackets in Python
- An example

```
>>> words = ['This', 'is', 'a', 'sentence']
```

- Think of your four favourite things.....what are they?

- How could we store them in a list?




Your Favourite Things!

```
>>> favourites = [‘books', ‘butterfly', ‘chocolate', 'skateboard']
```

You can put anything into a list

- You can have a list of integers

```
>>> primes = [1, 2, 3, 5, 11]
```

- You can have a lists of strings

```
>>> colours = ['red', 'blue’, 'green']
```

Accessing Lists!

- The favourites `list` holds four strings in order.

```
favourites = [‘books', ‘butterfly',
‘chocolate', 'skateboard']
```

- We can count out the items using index numbers!

0

1

2

3

- **Indices start from zero!**

Accessing Lists

- We access the items in a `list` with an index such as `[0]`:

```
>>> favourites[0]
'Books'
```

- What code do you need to access the third item in the list?

Falling off the edge

- Python complains if you try to go past the end of a `list`

```
>>> favourites = ['books', 'butterfly',
'chocolate', 'skateboard']
>>> favourites[4]


Traceback (most recent call last):
  File "<stdin>", line 1, in <module>
IndexError: list index out of range
```

List of lists!

You can put anything in a list, even more lists!

We could use a list of lists to store tennis partners.!

```
tennis_pairs =[["Alex", "Emily"], ["Kass",
"Annie"], ["Amara", "Viv"]]
```

Project time!

Now you know all about lists!

Let's put what we learnt into our project

Try to do Part 2

The tutors will be around to help!

If Statements

Conditions!

Conditions let us make decision.

First we test if the condition is met!

Then maybe we'll do the thing

<u>If it's raining</u> take an umbrella

Yep it's raining

..... take an umbrella

Booleans (True and False)

Computers store whether a condition is met in the form of

`True` and `False`

To figure out if something is `True` or `False` we do a comparison

```
5 < 10                  "Dog" == "dog"
3 + 2 == 5              "D" in "Dog"
5 != 5                  "Q" not in "Cat"
```

Booleans (True and False)

Computers store whether a condition is met in the form of

`True` and `False`

To figure out if something is `True` or `False` we do a comparison

5 < 10	True	"Dog" == "dog"
3 + 2 == 5		"D" in "Dog"
5 != 5		"Q" not in "Cat"

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5 != 5	False	"Q" not in "Cat"

Booleans (True and False)

Computers store whether a condition is met in the form of

`True` and `False`

To figure out if something is `True` or `False` we do a comparison

5 < 10	True	"Dog" == "dog"	False
3 + 2 == 5	True	"D" in "Dog"	
5 != 5	False	"Q" not in "Cat"	

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5 < 10	True	"Dog" == "dog"	False
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Booleans (True and False)

Computers store whether a condition is met in the form of

`True` and `False`

To figure out if something is `True` or `False` we do a comparison

5 < 10	True	"Dog" == "dog"	False
3 + 2 == 5	True	"D" in "Dog"	True
5 != 5	False	"Q" not in "Cat"	True

Conditions

So to know whether to do something, they find out if it's `True`!

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
```

Conditions

So to know whether to do something, they find out if it's `True`!

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
```

That's the condition!

Conditions

So to know whether to do something, they find out if it's `True`!

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
```

That's the condition!

Is it `True` that fave_num is less than 10?

- Well, fave_num is 5
- And it's `True` that 5 is less than 10
- So it is `True`!

Conditions

So to know whether to do something, they find out if it's `True`!

```
fave_num = 5
if True:
    print("that's a small number")
```

Put in the answer to the question

Is it `True` that fave_num is less than 10?

- Well, fave_num is 5
- And it's `True` that 5 is less than 10
- So it is `True`!

Conditions

So to know whether to do something, they find out if it's `True`!

```
fave_num = 5
if True:
    print("that's a small number")
```

What do you think happens?

```
>>>
```

Conditions

So to know whether to do something, they find out if it's `True`!

```
fave_num = 5
if True:
    print("that's a small number")
```

What do you think happens?

```
>>> that's a small number
```

Conditions

How about a different number???

```
fave_num = 9000
if fave_num < 10:
    print("that's a small number")
```

Conditions

Find out if it's `True`!

```
fave_num = 9000
if False:
    print("that's a small number")
```

Put in the answer to the question

Is it `True` that fave_num is less than 10?

- Well, fave_num is 9000
- And it's not `True` that 9000 is less than 10
- So it is `False`!

Conditions

How about a different number???

```
fave_num = 9000
if fave_num < 10:
    print("that's a small number")
```

What do you think happens?

```
>>>
```

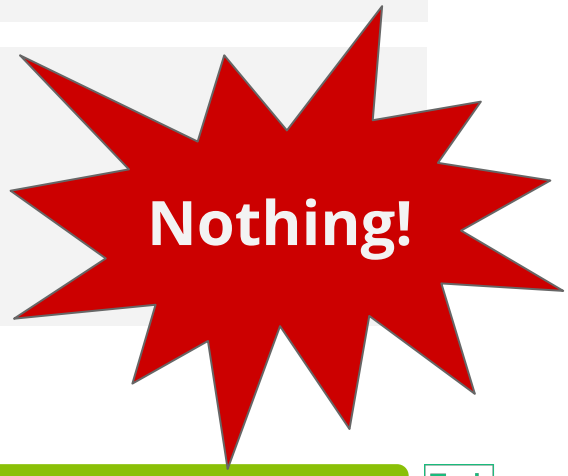
Conditions

How about a different number???

```
fave_num = 9000
if fave_num < 10:
    print("that's a small number")
```

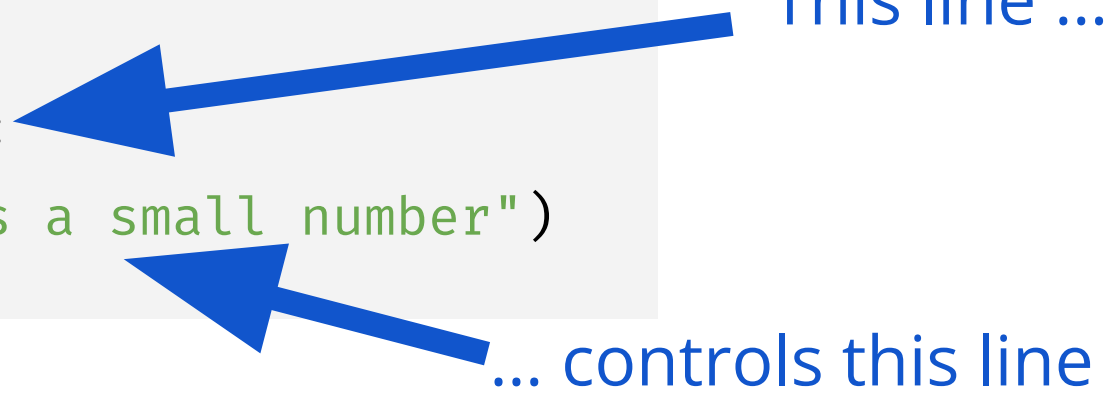
What do you think happens?

```
>>>
```



If statements

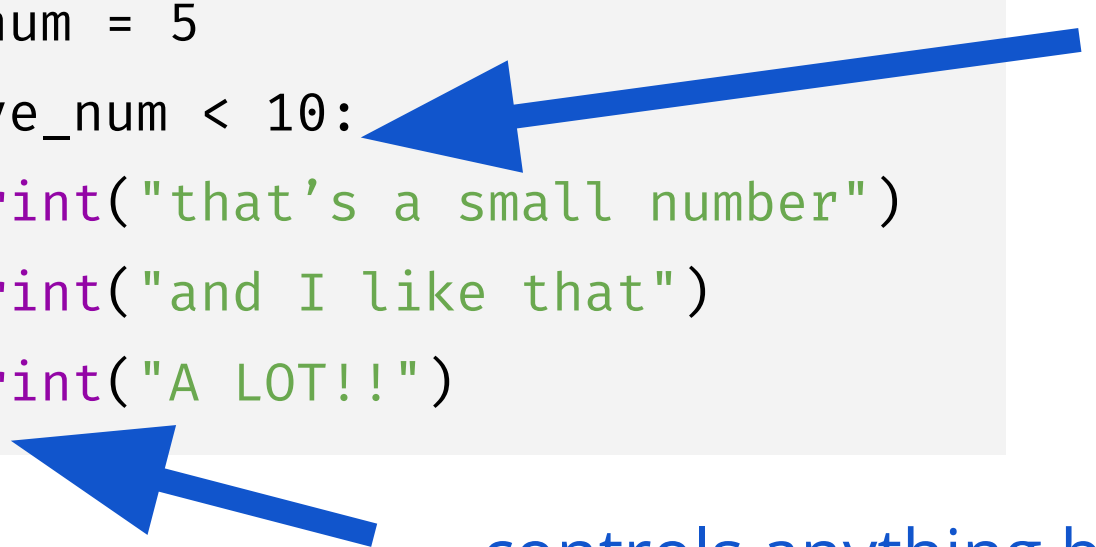
```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
```



If statements

Actually .....

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
    print("and I like that")
    print("A LOT!!")
```



If statements

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
    print("and I like that")
    print("A LOT!!")
```

What do you think happens?

```
>>>
```

If statements

```
fave_num = 5
if fave_num < 10:
    print("that's a small number")
    print("and I like that")
    print("A LOT!!")
```

```
>>> that's a small number
>>> and I like that
>>> A LOT!!
```

If statements

```
word = "GPN"
if word == "GPN":
  print("GPN is awesome!")
```

What happens?

If statements

```
word = "GPN"
if word == "GPN":
  print("GPN is awesome!")
```

What happens?

```
>>> GPN is awesome!
```

Else statements

`else` statements means something still happens if the **`if`** statement was **`False`**

```
word = "Chocolate"
if word == "GPN":
  print("GPN is awesome!")
else:
  print("The word isn't GPN :(")
```

What happens?

Project Time!

You now know all about `if` and `else`!

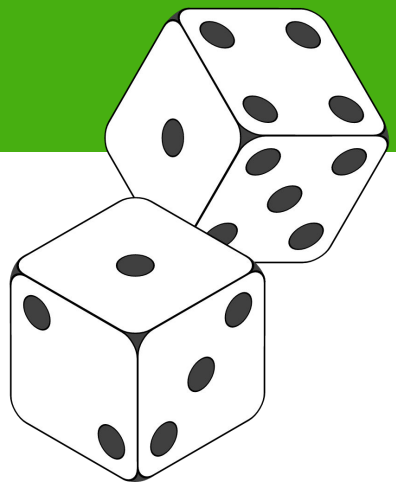
Let's put what we learnt into our project

Try to do Parts 3 and 4

The tutors will be around to help!

Random!

That's so random!



There's lots of things in life that are up to chance or random!

We're going to use the **random** module!

We want the computer to be random sometimes!

Using the random module

Let's choose something randomly from a list!

This is like drawing something out of a hat in a raffle!

Try this!

1. **Import the random module!**

```
>>> import random
```

2. **Copy the shopping list into IDLE**

```
>>> shopping_list = ["eggs", "bread", "apples", "milk"]
```

3. **Choose randomly! Try it a few times!**

```
>>> random.choice(shopping_list)
```

Using the random module

You can also assign your random choice to a variable

```
>>> import random
>>> shopping_list = ["eggs", "bread", "apples", "milk"]
>>> random_food = random.choice(shopping_list)
>>> print(random_food)
```

Project Time!

Raaaaaaaaaandom! Can you handle that?

Let's put what we learnt into our project

Try to do Part 5

The tutors will be around to help!

While Loops

Loops

We know how to do things on repeat!

Sometimes we want to do some code on repeat!

Introducing ... `while` loops!

What do you think this does?

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

Introducing ... `while` loops!

What do you think this does?

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

```
i is 0
i is 1
i is 2
>>>
```

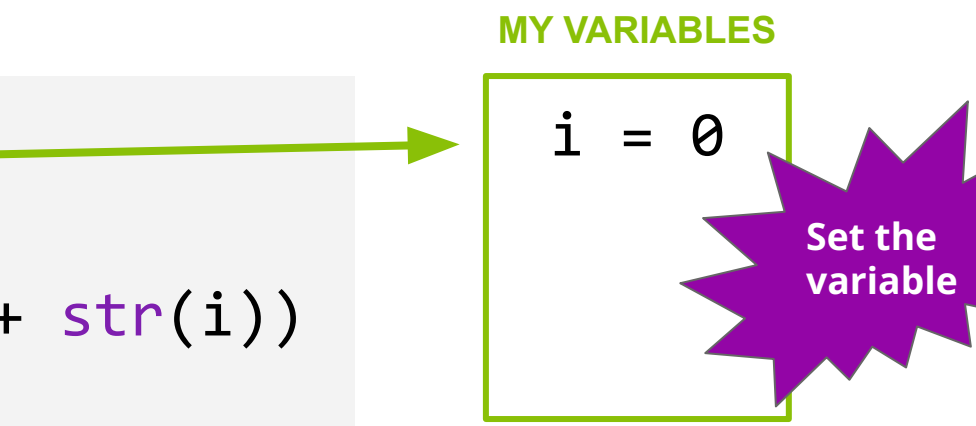
Introducing … `while` loops!

Stepping through a while loop…

Introducing … `while` loops!

One step at a time!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

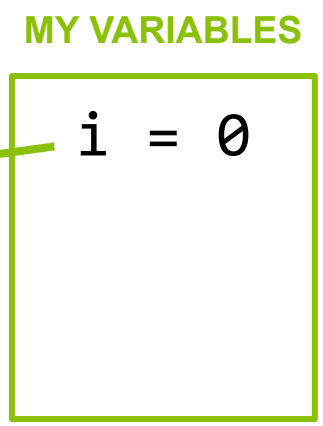


Introducing … `while` loops!

One step at a time!

0 is less than 3 !

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```



Introducing … `while` loops!

One step at a time!


```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

MY VARIABLES

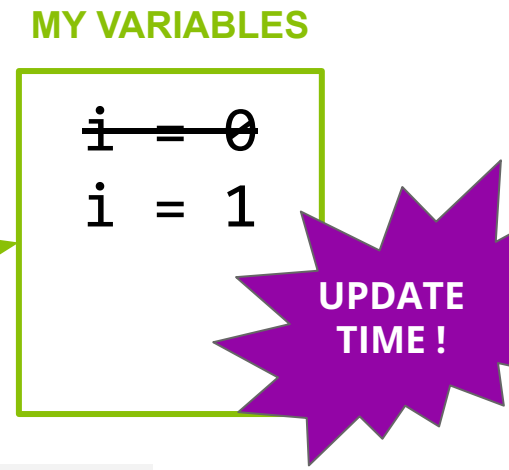
```
i = 0
```

```
i is 0
```

Introducing … `while` loops!

One step at a time!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```




```
i is 0
```

Introducing … `while` loops!

One step at a time!


```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

MY VARIABLES

~~i = 0~~
i = 1

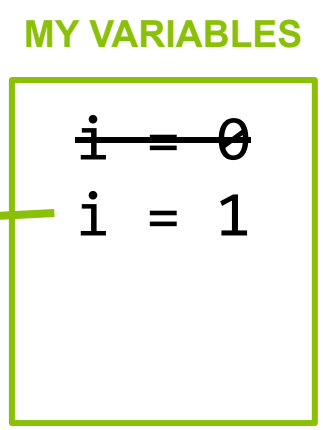
```
i is 0
```

Introducing … `while` loops!

One step at a time!

1 is less than 3 !

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```




```
i is 0
```

Introducing … `while` loops!

One step at a time!


```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

MY VARIABLES

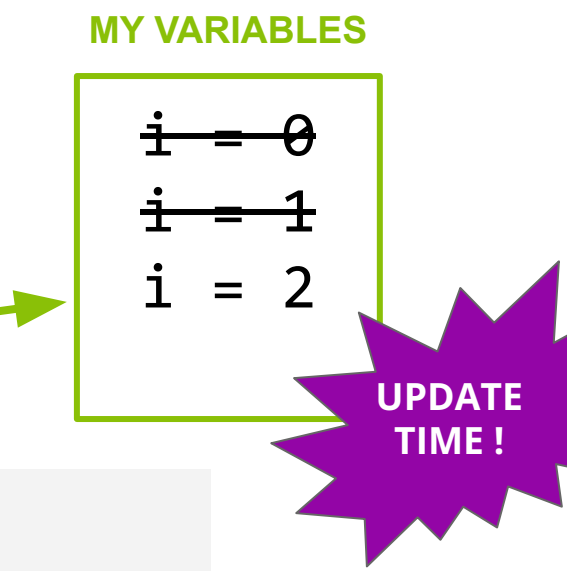
~~i = 0~~
i = 1

```
i is 0
i is 1
```

Introducing … `while` loops!

One step at a time!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```




```
i is 0
i is 1
```

Introducing … `while` loops!

One step at a time!


```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

MY VARIABLES

~~i = 0~~
~~i = 1~~
i = 2

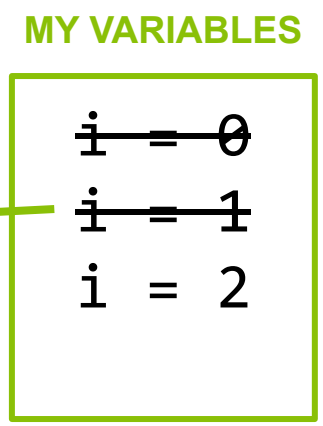
```
i is 0
i is 1
```

Introducing … `while` loops!

One step at a time!

2 is less than 3 !

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```




```
i is 0
i is 1
```

Introducing … `while` loops!

One step at a time!

Print !

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

```
i is 0
i is 1
i is 2
```

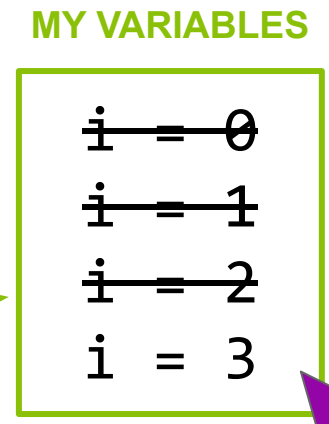
MY VARIABLES

~~i = 0~~
~~i = 1~~
i = 2

Introducing … `while` loops!

One step at a time!

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```




```
i is 0
i is 1
i is 2
```

Introducing … `while` loops!

One step at a time!


```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

MY VARIABLES

~~i = 0~~
~~i = 1~~
~~i = 2~~
i = 3

```
i is 0
i is 1
i is 2
```

Introducing ... `while` loops!

One step at a time!

3 IS NOT less than 3 !

```
i = 0
while i < 3:
    print("i is " + str(i))
    i = i + 1
```

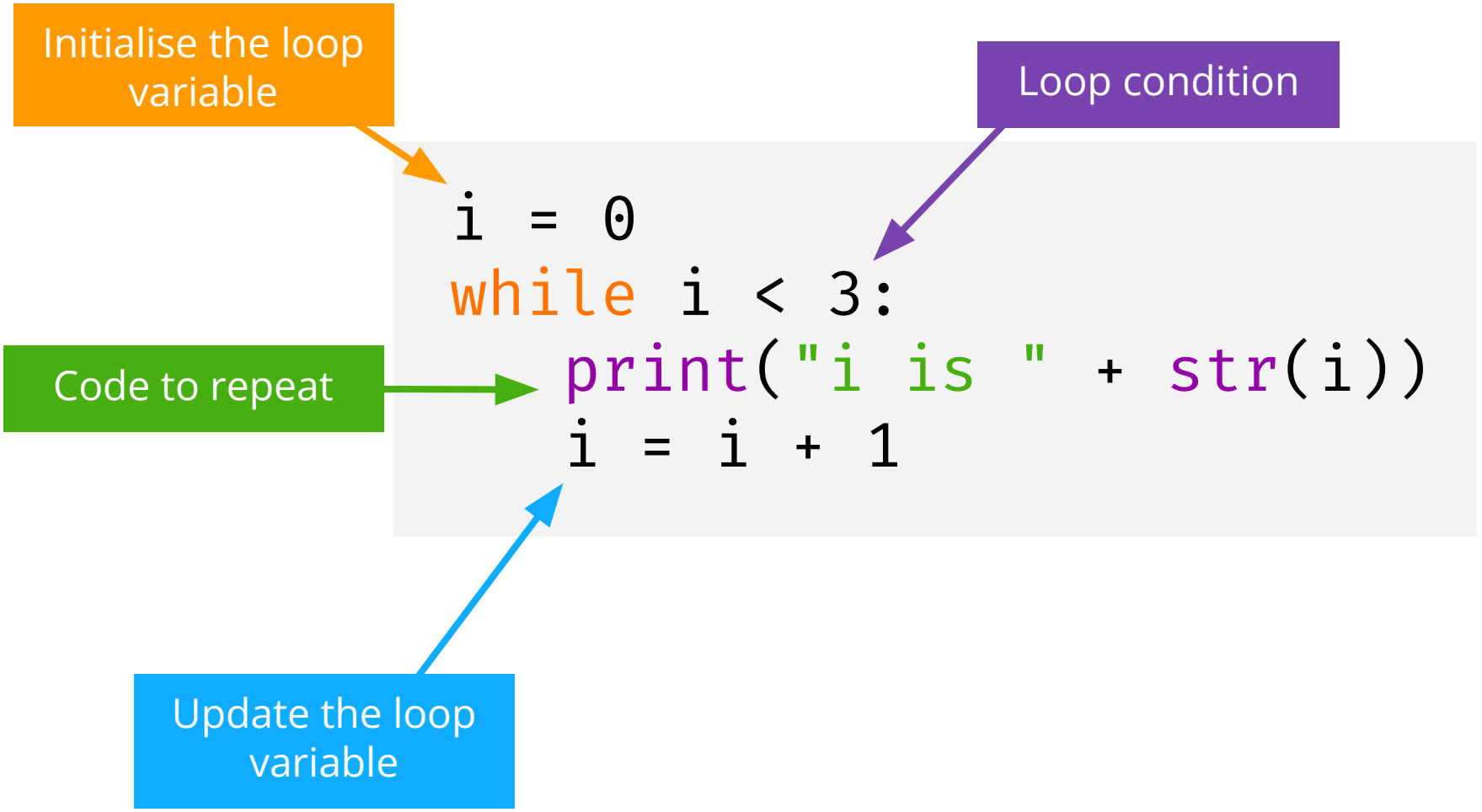
We are are done with this loop!

```
i is 0
i is 1
i is 2
```

MY VARIABLES

~~i = 0~~
~~i = 1~~
~~i = 2~~
i = 3

Introducing ... `while` loops!



What happens when.....

What happens if we forget to update the loop variable?

```
i = 0
while i < 3:
    print("i is " + str(i))
```

What happens when.....

What happens if we forget to update the loop variable?

```
i = 0
while i < 3:
    print("i is " + str(i))
```

```
i is 0
i is 0
i is 0
i is 0
i is 0
i is 0
i is 0
i is 0
i is 0
i is 0
i is 0
i is 0
i is 0
```

Infinite loop!

Sometimes we want our loop to go forever!

So we set a condition that is always True!

We can even just write True!

```
while True:
    print("Are we there yet?")
```

Infinite loop!

Sometimes we want our loop to go forever!

So we set a condition that is always True!

We can even just write True!

```
while True:
    print("Are we there yet?")
```

```
Are we there yet?
Are we there yet?
Are we there yet?
Are we there yet?
Are we there yet?
Are we there yet?
```

Project Time!

while we're here:

Let's put what we learnt into our project

Try to do Part 6!

Then try Extension Parts 7 - 10

The tutors will be around to help!

Tell us what you think!

Click on the

End of Day Form

and fill it in now!