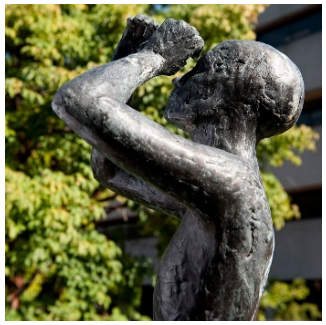


CS1117 – Introduction to Programming

Dr. Jason Quinlan,

School of Computer Science and Information Technology

A TRADITION OF INDEPENDENT THINKING

UCC

University College Cork, Ireland

Coláiste na hOllscoile Corcaigh

Announcements

CS1117 DSA students

Your labs and lectures have been cancelled for tomorrow

I will re-arrange a lab session for you for later in the week

All other students allocated to the G20 lab tomorrow from 4 - 6pm must attend as per usual

Announcements

Labs

So, as I stated this morning:

Lab 1 is re-open for submission

Going forward I will open the labs at 9am on Tuesday

Giving you plenty of time to read over them and ask questions as needed during lab time

Announcements

New students

Some new students have started in CS1117

Go to Canvas, read over the previous slides

Any questions, ask me after class, during the labs, and via email (j.quinlan@cs.ucc.ie)

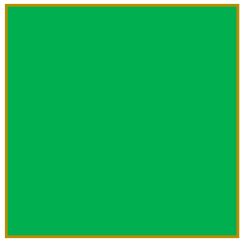
I'm only happy to help out ☺

Recap

- We introduced comparison statements
  - if – allows us to check if a condition is True or False
- if is constructed similar to functions
  - if condition:

    indent – statement block of code
- We introduced relational operators
  - < <= == != > >=
  - Permits comparison of different values (variables)
- We introduced Boolean operators
  - and – both expressions must be True for condition to be True
  - not – only one expression must be True for condition to be True
  - or – negates the expression/condition
    - From True to False, or False to True
- We saw how if compares Strings
  - Using ASCII characters (not via object values)
- We can use is to compare Strings using object values

if statement



So let's go back to Stranger Things…

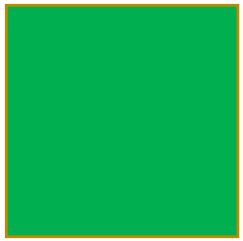
```
num_demogorgan = 0
num_demodog = 0
mind_flayer = 0

if num_demogorgan == 1:
    print("It's Stranger Things season 1, Eleven will save us")

if num_demodog == 10:
    print("It's Stranger Things season 2, Eleven will save us")

if mind_flayer == 1 and num_demogorgan == 1:
    print("It's Stranger Things season 3, Billy will save Eleven")
```

if statement



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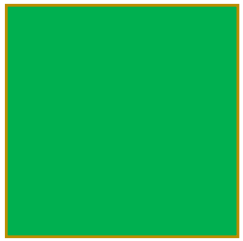
```

if is fine when we want to check if something is True or False

if statement



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```

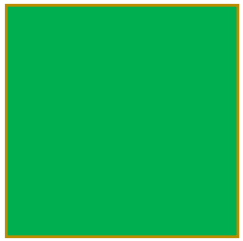
if is fine when we want to check if something is True or False

Can we use if to check when something has multiple possible values

if statement

Say we want to print “season 2” for all values of num_demodog from 1 to 10

if statement



Say we want to print “season 2” for all values of num_demodog from 1 to 10

```
num_demodog = 0

if num_demodog == 1:
    print("It's Stranger Things season 2, Eleven will save us")

if num_demodog == 2:
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...

if num_demodog == 9:
    print("It's Stranger Things season 2, Eleven will save us")

if num_demodog == 10:
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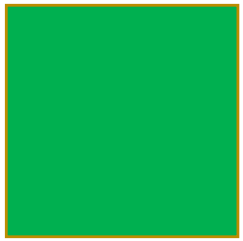
```

if statement



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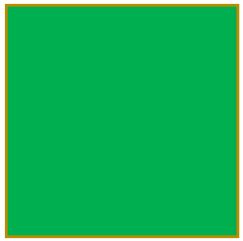
```

Lots of repeating code

if statement



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...

if num_demodog == 9:
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if num_demodog == 10:
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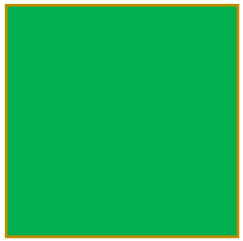
```

Lots of repeating code – possibility for bugs…

if statement

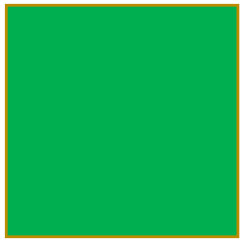


Easier to write:

```
num_demodog = 10

if num_demodog >= 1 and num_demodog <= 10:
    print("It's Stranger Things season 2, Eleven will save us")
```

if statement



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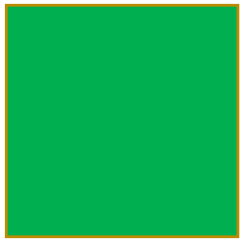
We can use relational operators and and to reduce the code

if statement



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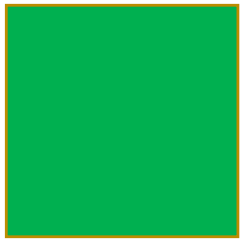
```

We can use relational operators and and to reduce the code

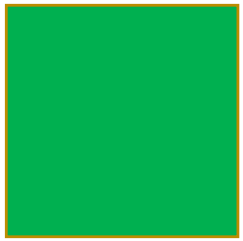
What can we do if we have two values…

if statement



Let’s move from Strangers Things and ask a question:

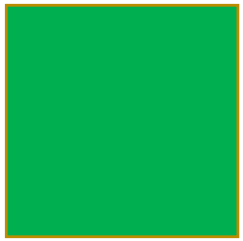
if statement



Let’s move from Strangers Things and ask a question:

I’m going to define this question as a function:

if statement

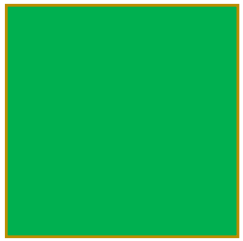


Let’s move from Strangers Things and ask a question:

I’m going to define this question as a function:

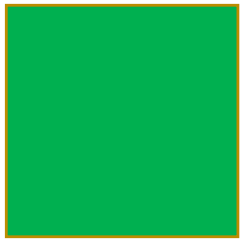
```
def the_choice(pill):
```

if statement



My choice has two inputs, so two if statements

if statement



My choice has two inputs, so two if statements

```
def the_choice(pill):

    if pill == "blue":
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    if pill == "red":
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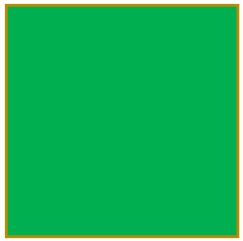
if statement



And if I make a choice, I get an output

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the_choice("blue")

# output
# You wake up in your bed and believe whatever you want to believe.
```

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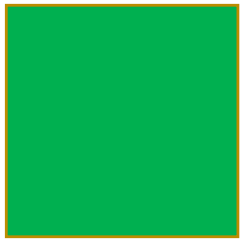

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the_choice("blue")

# output
# You wake up in your bed and believe whatever you want to believe.
```

Thank you, Morpheus

if statement

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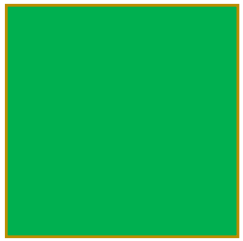

Again, we have the possibility of lots of colours
and the possibility of lots of bugs for repeat code

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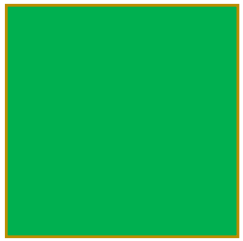

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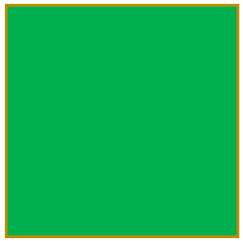
So let's change this…

if statement



Similar Code with the same output

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def the_choice(pill):

    if pill == "blue":
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    else:
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the_choice("blue")

# output
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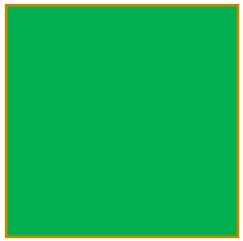
if statement



Similar Code with the same output

The only difference is instead of checking for the red pill

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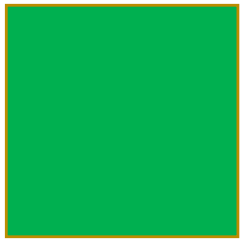

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the_choice("blue")

# output
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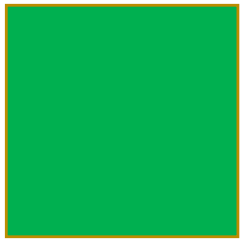
```

We add code to check if the pill is not “blue”

if statement



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the_choice("blue")

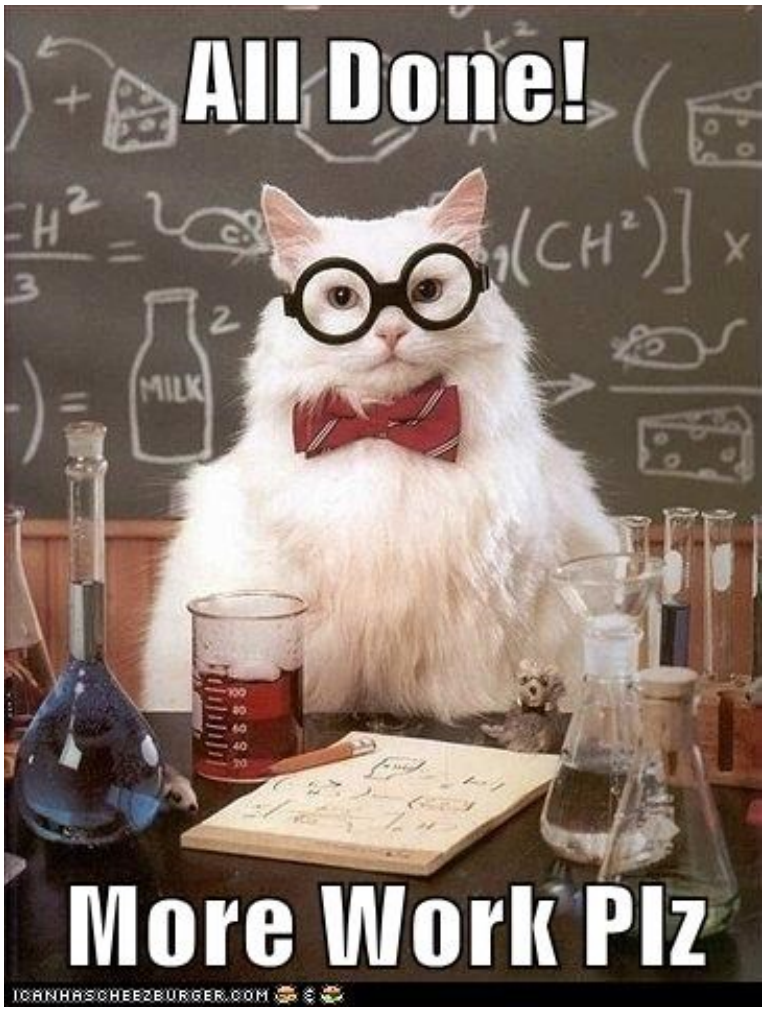
# output
# You wake up in your bed and believe whatever you want to believe.
```

We add code to check if the pill is not “blue”

else: gives us the ability to add a statement block if the if statement is false

Canvas Student App

Let’s Sign into this lecture now



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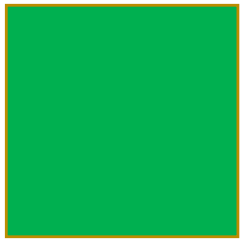
Coláiste na hOllscoile Corcaigh

if statement



Let's change this to check for my favourite character:
Neo or Morpheus?

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    else:
        print("Morpheus is my favourite character.")
```

if statement

Let’s change this to check for my favourite character:
Neo or Morpheus?

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def the_choice(character):

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```

Perfect, but what happens if someone picks Trinity.

if statement

Let's change this to check for my favourite character:
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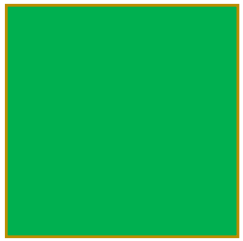
```

Perfect, but what happens if someone picks Trinity.

She is brilliant in the movies…

if statement



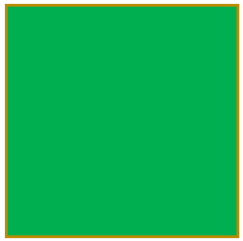
What is going to happen??

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")
```

if statement



What is going to happen??

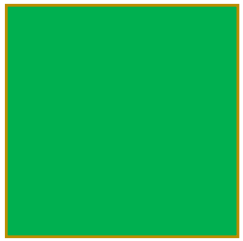
```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# "Morpheus is my favourite character."
```

if statement



What is going to happen??

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def the_choice(character):

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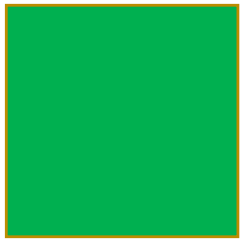
the_choice("Trinity")

# output
# "Morpheus is my favourite character."
```

Oops…

if statement



Okay, easy to fix….

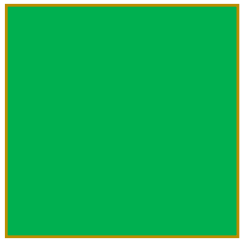
```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

if statement



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```
def the_choice(character):

    if character == "Neo":
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    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

We can add an additional conditional check…

if statement

Okay, easy to fix….

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

We can add an additional conditional check… using elif

if statement

elif is used the exact same as if, but…

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

if statement

elif is used the exact same as if, but…

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

As soon as one of the condition checks is true

if statement

elif is used the exact same as if, but…

```
def the_choice(character):

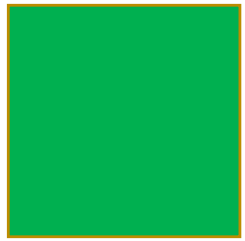
    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

As soon as one of the condition checks is true
the other checks are ignored

if statement



Let's look at an example…

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

if statement

Let’s look at an example…

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

Let’s stay with Trinity.

if statement

Let's look at an example…

```
def the_choice(character):

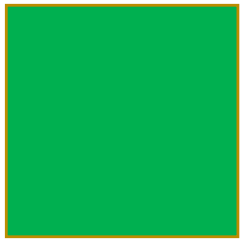
    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

We pass "Trinity" to the_choice function

if statement



Let's look at an example…

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

We check if character is equal to "Neo" (using ASCII values)

if statement

Let's look at an example…

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

This is False, so we don't execute that statement block
And we move to the next conditional check

if statement

Let's look at an example…

```
def the_choice(character):

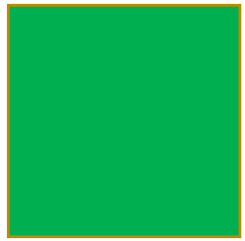
    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

We check if character is equal to "Trinity" (using ASCII values)

if statement



Let's look at an example…

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def the_choice(character):

    if character == "Neo":
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    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

This is True, so we execute that statement block

if statement

Let's look at an example…

```
def the_choice(character):

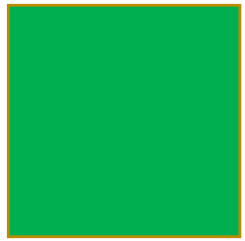
    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

And we get our output

if statement



Let's look at an example…

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def the_choice(character):

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    else:
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the_choice("Trinity")

# output
# Trinity is my favourite character.
```

But what about the else?

if statement

Let's look at an example…

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Trinity")

# output
# Trinity is my favourite character.
```

But what about the else?
Once one conditional check is True, all other code is ignored

if statement

Let's look at an example…

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Neo")

# output
# Neo is my favourite character.
```

If we had chosen "Neo"

if statement

Let's look at an example…

```
def the_choice(character):

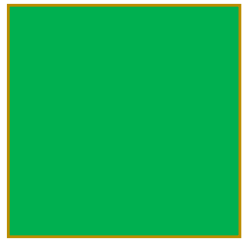
    if character == "Neo":
        print("Neo is my favourite character.")
    elif chara er == rinity":
        print("T y is my favourite character.")
    else:
        print( orphe is my favourite character.")


the_choice("Neo")

# output
# Neo is my favourite character.
```

If we had chosen "Neo"
Then all other conditional checks would have been ignored

if statement



Why is this beneficial?

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")

    if character == "Trinity":
        print("Trinity is my favourite character.")

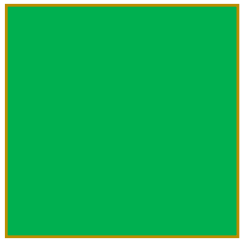
    if character == "Morpheus":
        print("Morpheus is my favourite character.")


the_choice("Neo")

# output
# Neo is my favourite character.
```

If we had rewritten our code as 3 separate if statements
The output would be the same

if statement



Why is this beneficial?

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")

    if character == "Trinity":
        print("Trinity is my favourite character.")

    if character == "Morpheus":
        print("Morpheus is my favourite character.")


the_choice("Neo")

# output
# Neo is my favourite character.
```

But once “Neo” was True

if statement

Why is this beneficial?

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")

    if character == "Trinity":
        print("Trinity is my favourite character.")

    if character == "Morpheus":
        print("Morpheus is my favourite character.")


the_choice("Neo")

# output
# Neo is my favourite character.
```

But once “Neo” was True
we would still check “Trinity” and “Morpheius”

if statement

Why is this beneficial?

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")

    if character == "Trinity":
        print("Trinity is my favourite character.")

    if character == "Morpheus":
        print("Morpheus is my favourite character.")


the_choice("Neo")

# output
# Neo is my favourite character.
```

But once “Neo” was True
we would still check “Trinity” and “Morpheius”

if statement

Why is this beneficial?

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")

    if character == "Trinity":
        print("Trinity is my favourite character.")

    if character == "Morpheus":
        print("Morpheus is my favourite character.")

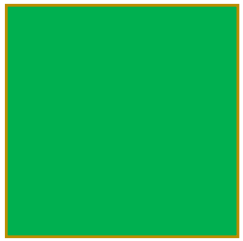

the_choice("Neo")

# output
# Neo is my favourite character.
```

So not efficient

Computationally, we are checking code we don't need to check.

if statement



Why is this beneficial?

```
def the_choice(character):

    if character == "Neo":
        print("Neo is my favourite character.")
    elif character == "Trinity":
        print("Trinity is my favourite character.")
    else:
        print("Morpheus is my favourite character.")


the_choice("Neo")

# output
# Neo is my favourite character.
```

So, if, elif and else are much more efficient

if, if/else and elif Recap

- We introduced if conditional statements over ranges of values
  - num_demodog from 1 to 10
- We added checks to run code when a conditional statement is False

```
if (condition):
    run code if condition is True
else:
    run code if condition is False
```

- And we added checks for multiple inputs using elif

```
if (condition1):
    run code if condition1 is True
elif (condition2):
    run code if condition2 is True
else:
    run code if both condition1 and condition2 are False
```

Live Coding Time…

UCC
University College Cork, Ireland
Coláiste na hOllscoile Corcaigh