print("Hello, World!")

NCSS Challenge - Beginners
Week 4 Part 1

GROK LEARNING

What will we cover?

- Looping with conditions;
- Counters;
- Counting with while loops.

What does this cover?

- Design, modify and follow simple algorithms involving sequences of steps, branching, and **iteration (repetition)** (ACTDIP019)
- Implement digital solutions as simple visual programs involving branching, **iteration (repetition)**, and user input (ACTDIP020)
- Implement... **iteration** and functions in a **general-purpose programming language** (ACTDIP030)

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1 Looping with conditions

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Loops so far...

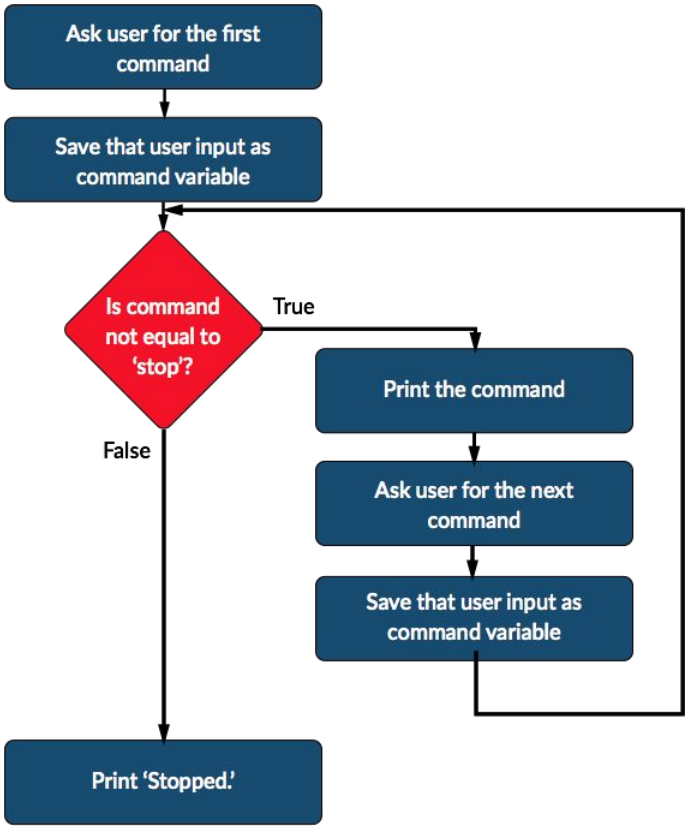
- So far we've seen for loops over:
  - Strings (looping over each character)
  - Numbers (counting between two numbers)
- These only work if we already know how many times we want to loop, or how many characters a word has.
- We might want to loop *until* something changes!
- For this we need a `while` loop!

While loops!

- Using a while loop, we can repeat some code *while* a condition is true:

```
command = input('First command: ')
while command != 'stop':
  print('You entered ' + command)
  command = input('Command: ')
print('Stopped.')
```

Let’s look in diagram form.



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Teacher Aside! While loops are particularly tricky!

- There are lots of ‘gotchas’ with while loops. They can be a tricky thing for students to get their heads around.
- One fun activity is to get students to design an algorithm for, say, eating a bowl of cereal, - continue until it is finished.

Some common hiccups - not starting right:

- Being finished before you even start!

```
command = 'stop'
while command != 'stop':
  print('You entered ' + command)
  command = input('Command: ')
print('Stopped.')
```

- The command was already `'stop'`, so the loop never ran!

Some common hiccups - bad setup:

- Forgetting setup

```
while command != 'stop':
    print('You entered ' + command)
    command = input('Command: ')
print('Stopped.')
```

```
NameError: name 'command' is not defined
```

Some common hiccups - infinite loops!

```
command = input('First command: ')
while command != 'stop':
    print('You entered ' + command)
command = input('Command: ')
print('Stopped.')
```

The while loop will keep repeating *while* the condition is True. In this example, we ask for the first command, but then we never ask for the next command!

Test it out!

Try the first question now!

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Looping until blank lines

- A very common pattern is to loop until a line is blank:

```
line = input('Enter line: ')
while line:
  print('Still running')
  line = input('Enter line: ')
print('Stopped')
```

Note: We used a shortcut here, we could also use:

```
while line != ''
```

Test it out!
(Put it together!)

Try the second question now!

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2 Counters - keeping track

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Keep track of those while loop iterations

- We can use a counter, a variable that starts at 0 or 1, to keep track of how many times a loop runs:

```
counter = 1
guess = input('Guess my favourite colour: ')
while guess.lower() != 'yellow':
  counter = counter + 1  # Add 1 to counter.
  guess = input('Try again: ')
print('You got it in', counter, 'tries.')
```

Teacher Aside! Counting up!

- This example counts from 1, rather than 0, because by the time we are incrementing the counter, we have already made one guess!

Teacher Aside! Incrementing counters like a pro!

- There's another way to increment the counter! In the previous example, we do:

```
counter = counter + 1
```

- We can also use the following notation:

```
counter += 1
```

- They both mean:
  Take the value in `counter` *and add one to it.*

Building up a string

- Just like we add 1 to a counter each loop iteration, we can also add to a string each time the loop repeats.

```
message = 'e'
while message != 'eeeee':
  print(message)
  message = message + 'e'
```

Test it out!

Try the third question now!

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2

Numbers in while loops

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Using numbers in while loops for numerical decisions

- We can use mathematical conditions in `while` loops:

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

While i is less than 3, print i, and add 1 to i.

Some common hiccups - not starting right:

- Not meeting the loop criteria initially:

```
i = 0
while i > 3:
    print(i)
    i = i + 1
```

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Some common hiccups - not starting right:

- Not incrementing the value of `i`:

```
i = 0
while i < 3:
    print(i)
```

- This will cause an infinite loop!

Stepping in loops

- Instead of incrementing i by 1, we can add a bigger step! For example, we can print only odd numbers:

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

While i is less than 10, print i, and then add 2 to i.

Loop countdown!

- Just as we can step up, we can also step down!

```
j = 10
while j > 3:
    print(j)
    j = j - 1
```

While j is more than 3, print j, and then reduce it by 1.

Test it out!

Try the fourth question now!

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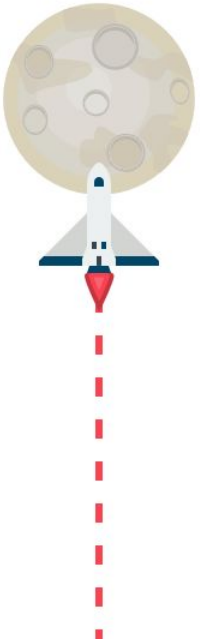

Any Questions?

Find me at:
@groklearning
nicky@groklearning.com

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