`while` loops

This document helps you understand `while` loops through many different examples and exercises.

To run the examples, ***type the code yourself***. Do *not* copy and paste.

For each exercise, you can use the “Python Tutor” online visualiser (https://pythontutor.com/visualize.html#mode=edit) to run the code step by step. This is very important because visualising the code execution helps you understand how Python really works.

Ex01

Type the code below in the file `hello_print.py` and run it.

```
print("Hello!")
print("Hello!")
print("Hello!")
```

Ex02a

Type the code below in the file `hello_while.py` and run it.

```
count = 0
while count < 3:
        print("Hello!")
        count += 1
```

How many times is the text “Hello!” shown in the terminal?

Ex02b

Modify the code from **Ex02a** so that the text “Hello!” is shown 5 times in the terminal.

Ex02c

Modify the code from **Ex02a** so that the text “Hello!” is shown 15 times in the terminal.

Ex02d

Modify the code from **Ex02a** so that the text “Hello!” is shown 2 times in the terminal.

Ex03

Create a new empty file `bye_while.py`.
In the file, write a
`while` loop that prints the text “bye” 3 times.

Ex04a

Look at the code below. If you run the code, how many times will the text “Hello!” be shown?

Write the code in the file `ex04a.py` and run it to check if you were right.

```
count = 0
while count < 10:
    print("Hello!")
```

(You can press `Ctrl` + `C` to stop your program.)

Ex04b

Look at the code below. If you run the code, how many times will the text “Hello!” be shown?

Write the code in the file `ex04b.py` and run it to check if you were right.

```
count = 10
while count < 10:
    print("Hello!")
```

Ex05a

Look at the code below. If you run the code, what will the terminal show?
Write the code in the file
`ex05a.py` and run it to check if you were right.

```
count = 0
while count < 5:
        print(count)
        count += 1
```

Ex05b

Look at the code below. If you run the code, what will the terminal show?
Write the code in the file
`ex05b.py` and run it to check if you were right.

```
count = 0
while count < 5:
    count += 1
    print(count)
```

Ex05c

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex05c.py` and run it to check if you were right.

```
count = 10
while count > 0:
    count -= 1
    print(count)
```

Ex05d

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex05d.py` and run it to check if you were right.

```
count = 10
while count > 0:
    print(count)
    count -= 1
```

Ex05e

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex05e.py` and run it to check if you were right.

```
count = 10
while count >= 0:
    print(count)
    count -= 1
```

Ex05f

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex05f.py` and run it to check if you were right.

```
count = 10
while count >= 0:
    count -= 1
    print(count)
```

Ex05g

Create the file `ex05g.py`.

In the file, write a `while` loop that prints the numbers from `15` to `0`, inclusive.

The output should look like this:

```
15
14
13
...
2
1
0
```

Ex06a

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex06a.py` and run it to check if you were right.

```
count = 0
stop_at = 20
while count <= stop_at:
    print(count)
    count += 2
```

Ex06b

In the file `ex06b.py` create a loop similar to **Ex05a** that prints the numbers `0`, `2`, `4`, ..., `36`, `38`, `40`.

Ex07a

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex07a.py` and run it to check if you were right.

```
number = 20
while number >= 0:
    print(number)
    number -= 2
```

Ex07b

In the file `ex07b.py` create a loop similar to **Ex06b** that prints the numbers `40`, `38`, `36`, ..., `4`, `2`, `0`.

Ex08

In the file `ex08.py` create a `while` loop that prints the numbers `0`, `3`, `6`, `9`, `12`, `15`, `18`, `21`, `24`, `27`, and `30`.

Ex09a

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex09a.py` and run it to check if you were right.

```
count = 0
number = 0
while count < 10:
    number += 1
    count += 1
    print(number)
```

Ex09b

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex09b.py` and run it to check if you were right.

```
count = 0
number = 15
while count < 10:
    number += 1
    count += 1
    print(number)
```

Ex09c

In the file `ex09c.py` write a loop similar to that from **Ex08b** that prints the numbers from `46` to `55`.

The output should look like this:

```
46
47
48
...
54
55
```

Ex09d

In the file `ex09d.py` write a loop similar to that from **Ex08b** that prints the numbers from `16` to `35`.

The output should look like this:

```
16
17
```

```
18
...
33
34
35
```

Ex10a

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex10a.py` and run it to check if you were right.

```
count = 0
number = 0
while count < 10:
    count += 1
    number += 2
    print(number)
```

Ex10b

Look at the code below. If you run the code, what will the terminal show?
How many numbers will be printed on the terminal?

Write the code in the file `ex10b.py` and run it to check if you were right.

```
count = 0
number = 0
while count < 20:
    count += 1
    number += 1000
    print(number)
```

Ex10c

In the file `ex10c.py` write a `while` loop similar to that of **Ex09b** that prints a total of 32 numbers starting at `1000`.

The output should look like this:

```
1000
2000
3000
...
31000
32000
```

Ex11a

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex11a.py` and run it to check if you were right.

```
count = 0
total = 0
while count < 5:
    count += 1
    total *= 2
    print(total)
```

Why are all the values shown in the terminal the same?

Ex11b

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex11b.py` and run it to check if you were right.

```
count = 0
total = 1
while count < 5:
    count += 1
```

```
    total *= 2
    print(total)
```

Ex12a

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex12a.py` and run it to check if you were right.

```
count = 0
total = 0
while count < 5:
    total += count
    count += 1
print(total)
```

Ex12b

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex12b.py` and run it to check if you were right.

```
count = 0
total = 0
while count < 5:
    count += 1
    total += count
print(total)
```

Ex13

In the file `ex13.py` write a `while` loop that sums all the numbers from `1` to `100`. The final result should be `5050`.

Ex14a

Look at the code below. If you run the code, what will the terminal show?

Write the code in the file `ex14a.py` and run it to check if you were right.

```
number = 0
value = 1
while number < 4:
    number += 1
    value *= number
print(value)
```

Ex14b

In the file `ex14b.py` write a `while` loop that multiplies the numbers from `1` to `5` together.
The final result should be `120`.

Ex14c

In the file `ex14c.py` write a `while` loop that multiplies the numbers from `1` to `10` together.
The final result should be `3628800`.

Ex14d

In the file `ex14d.py` write a `while` loop that multiplies the numbers from `1` to `15` together.
The final result should be `1307674368000`.