# Network Programming in Python I

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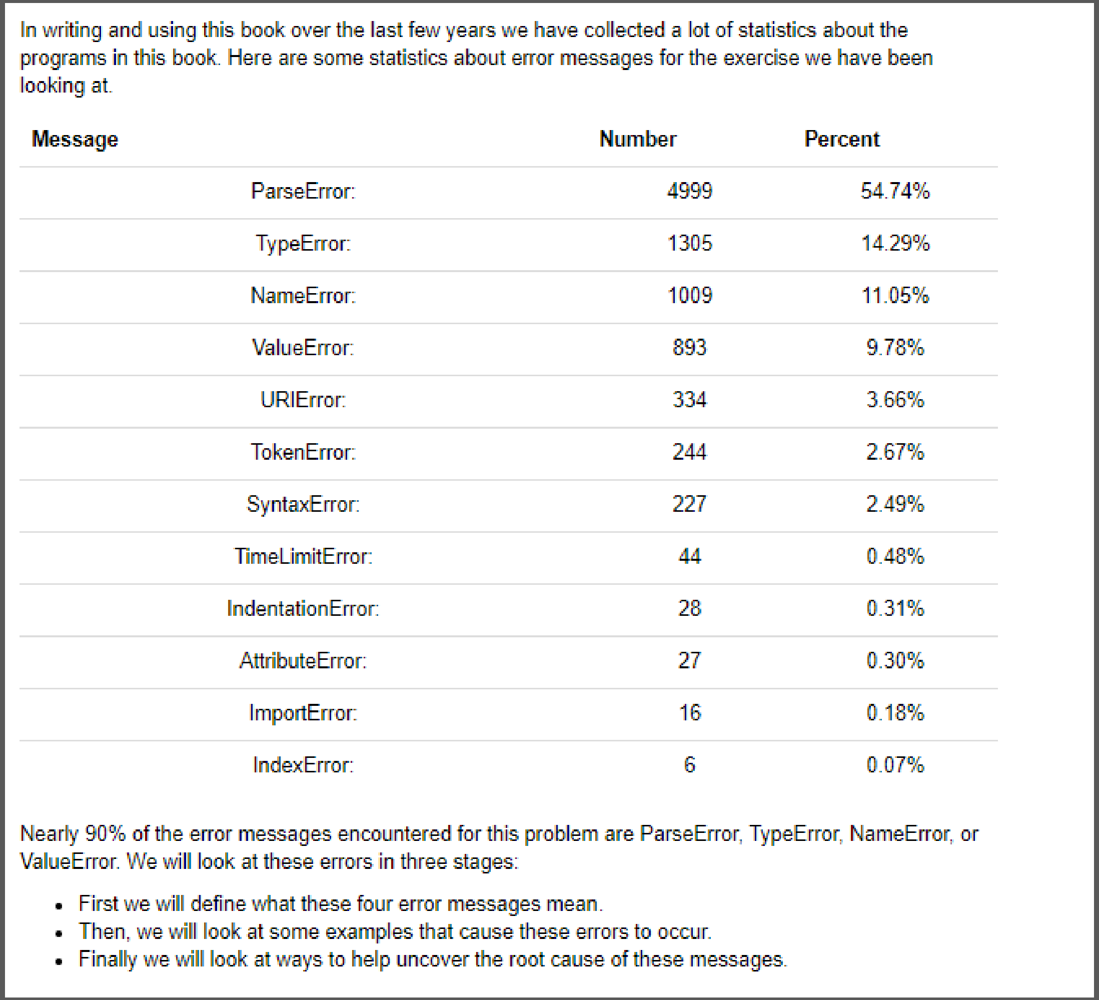
# Review

Any Questions?

# Errors



In writing and using this book over the last few years we have collected a lot of statistics about the programs in this book. Here are some statistics about error messages for the exercise we have been looking at.

| Message | Number | Percent |
|---|---|---|
| ParseError: | 4999 | 54.74% |
| TypeError: | 1305 | 14.29% |
| NameError: | 1009 | 11.05% |
| ValueError: | 893 | 9.78% |
| URIError: | 334 | 3.66% |
| TokenError: | 244 | 2.67% |
| SyntaxError: | 227 | 2.49% |
| TimeLimitError: | 44 | 0.48% |
| IndentationError: | 28 | 0.31% |
| AttributeError: | 27 | 0.30% |
| ImportError: | 16 | 0.18% |
| IndexError: | 6 | 0.07% |

Nearly 90% of the error messages encountered for this problem are ParseError, TypeError, NameError, or ValueError. We will look at these errors in three stages:

- First we will define what these four error messages mean.
- Then, we will look at some examples that cause these errors to occur.
- Finally we will look at ways to help uncover the root cause of these messages.

## ParseError

Parse errors happen when you make an error in the syntax of your program. Syntax errors are like making grammatical errors in writing. If you don’t use periods and commas in your writing then you are making it hard for other readers to figure out what you are trying to say. Similarly Python has certain grammatical rules that must be followed or else Python can’t figure out what you are trying to say.

Usually ParseErrors can be traced back to missing punctuation characters, such as parentheses, quotation marks, or commas. Remember that in Python commas are used to separate parameters to functions. Paretheses must be balanced, or else Python thinks that you are trying to include everything that follows as a parameter to some function.

## TypeError

TypeErrors occur when you you try to combine two objects that are not compatible. For example you try to add together an integer and a string. Usually type errors can be isolated to lines that are using mathematical operators, and usually the line number given by the error message is an accurate indication of the line.

## NameError

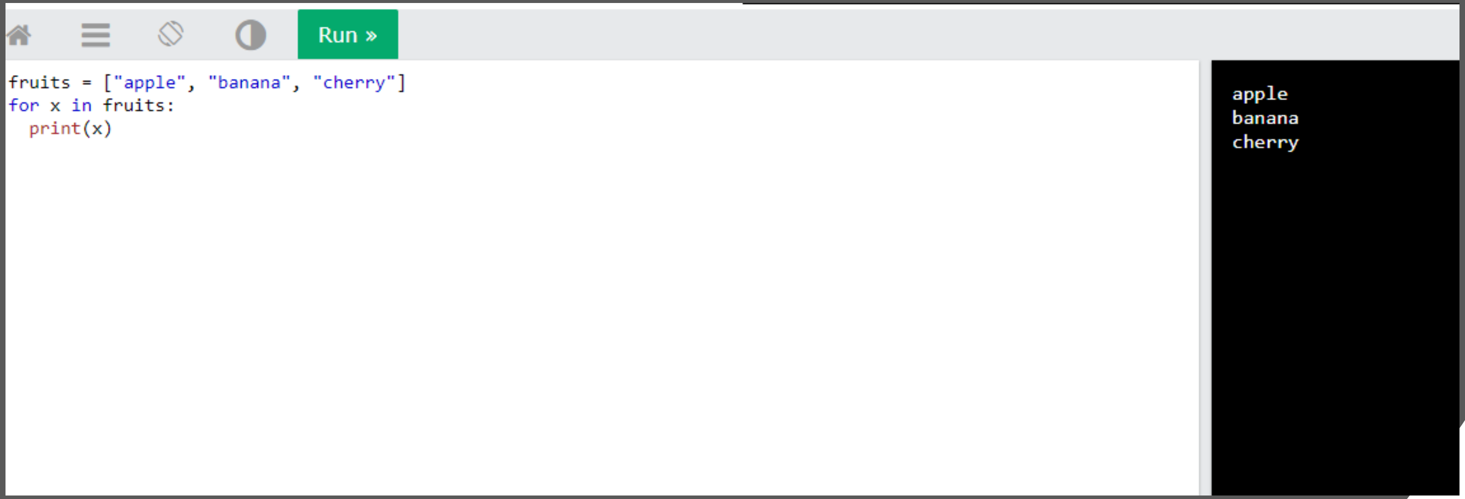
Name errors almost always mean that you have used a variable before it has a value. Often NameErrors are simply caused by typos in your code. They can be hard to spot if you don’t have a good eye for catching spelling mistakes. Other times you may simply mis-remember the name of a variable or even a function you want to call.

## ValueError

Value errors occur when you pass a parameter to a function and the function is expecting a certain limitations on the values, and the value passed is not compatible.

# For Loop

A `for` loop is used for iterating over a sequence (that is either a list, a tuple, a dictionary, a set, or a string).
This is less like the `for` keyword in other programming languages, and works more like an iterator method as found in other object-orientated programming languages.
With the `for` loop we can execute a set of statements, once for each item in a list, tuple, set etc.

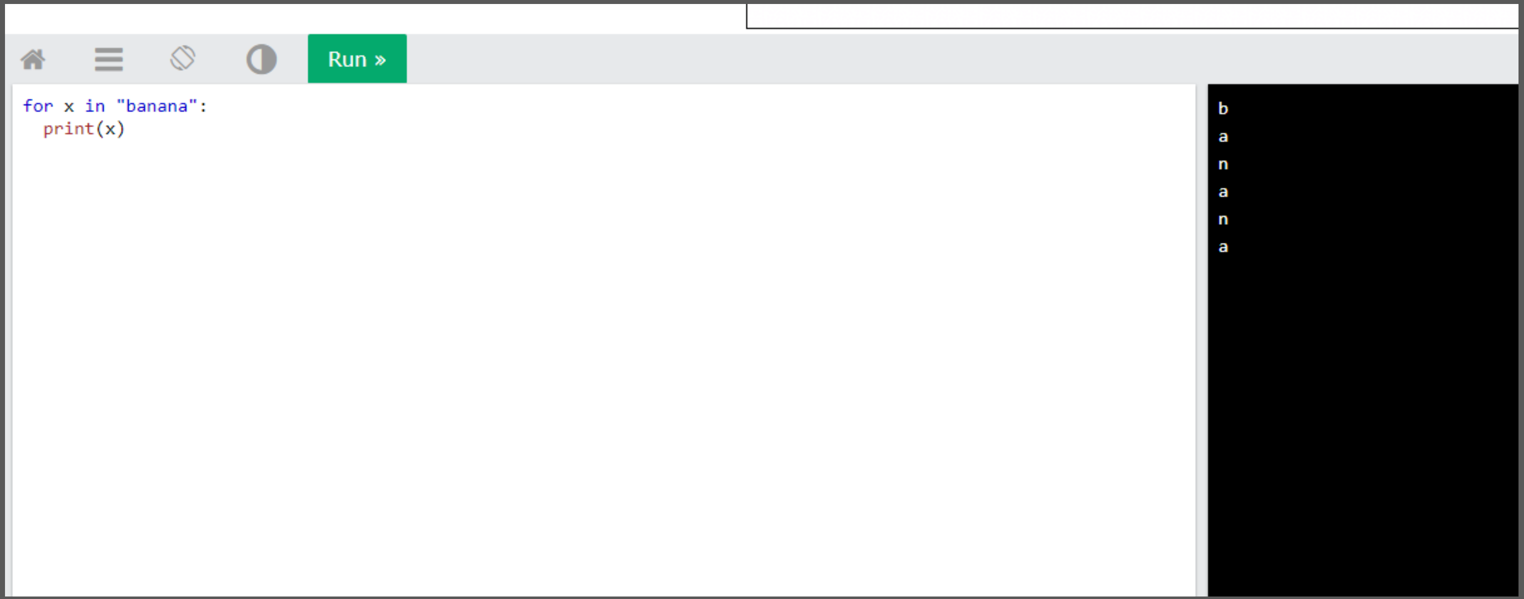


```python
fruits = ["apple", "banana", "cherry"]
for x in fruits:
  print(x)
```

```
apple
banana
cherry
```

## For Loop

Even strings are iterable objects, they contain a sequence of characters:

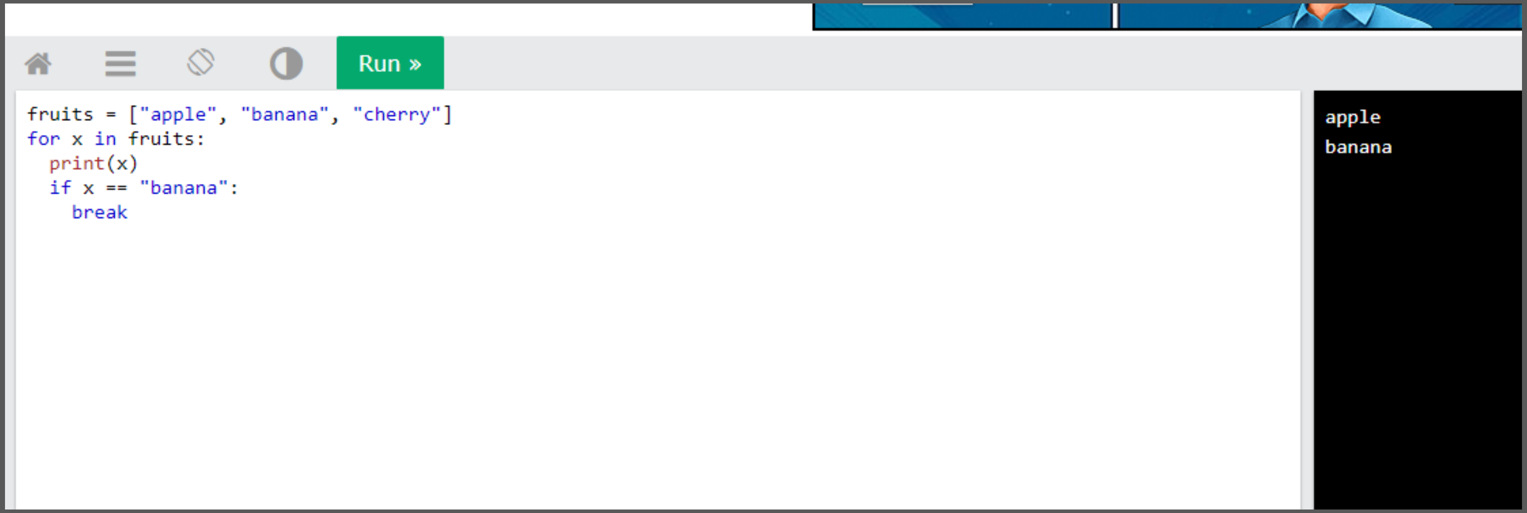


```
for x in "banana":
  print(x)
```

```
b
a
n
a
n
a
```

## For Loop

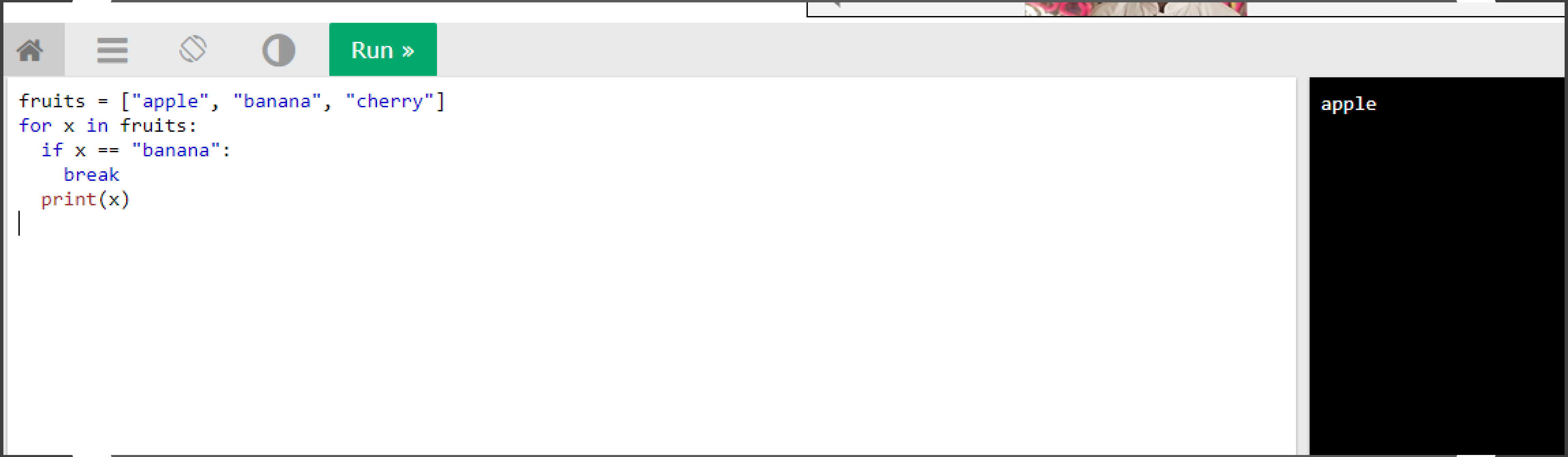
With the `break` statement we can stop the loop before it has looped through all the items:



```
fruits = ["apple", "banana", "cherry"]
for x in fruits:
  print(x)
  if x == "banana":
    break
```

```
apple
banana
```

# For Loop

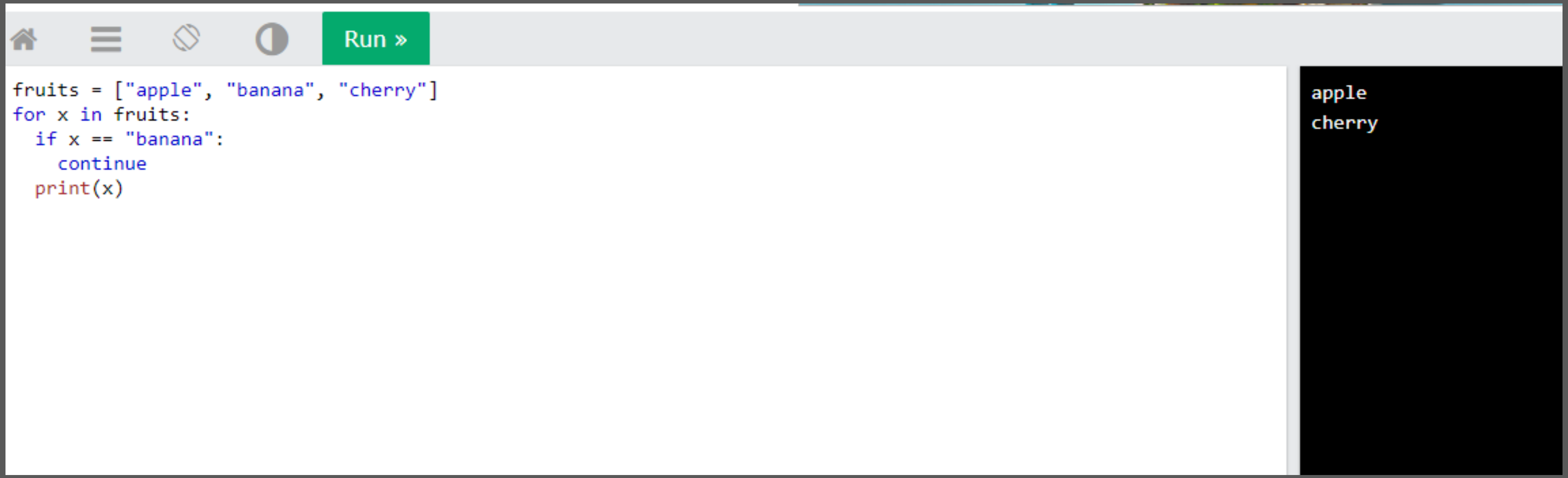


```
fruits = ["apple", "banana", "cherry"]
for x in fruits:
  if x == "banana":
    break
  print(x)
```

```
apple
```

## For Loop

With the continue statement we can stop the current iteration of the loop, and continue with the next:

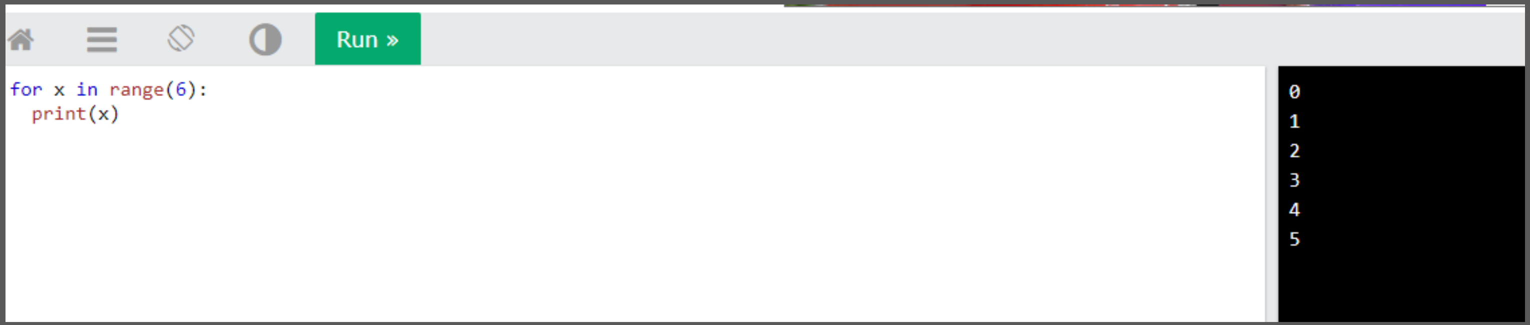


```
fruits = ["apple", "banana", "cherry"]
for x in fruits:
  if x == "banana":
    continue
  print(x)
```

```
apple
cherry
```

## For Loop

To loop through a set of code a specified number of times, we can use the range() function,
The range() function returns a sequence of numbers, starting from 0 by default, and increments by 1 (by default), and ends at a specified number.
Note that range(6) is not the values of 0 to 6, but the values 0 to 5.

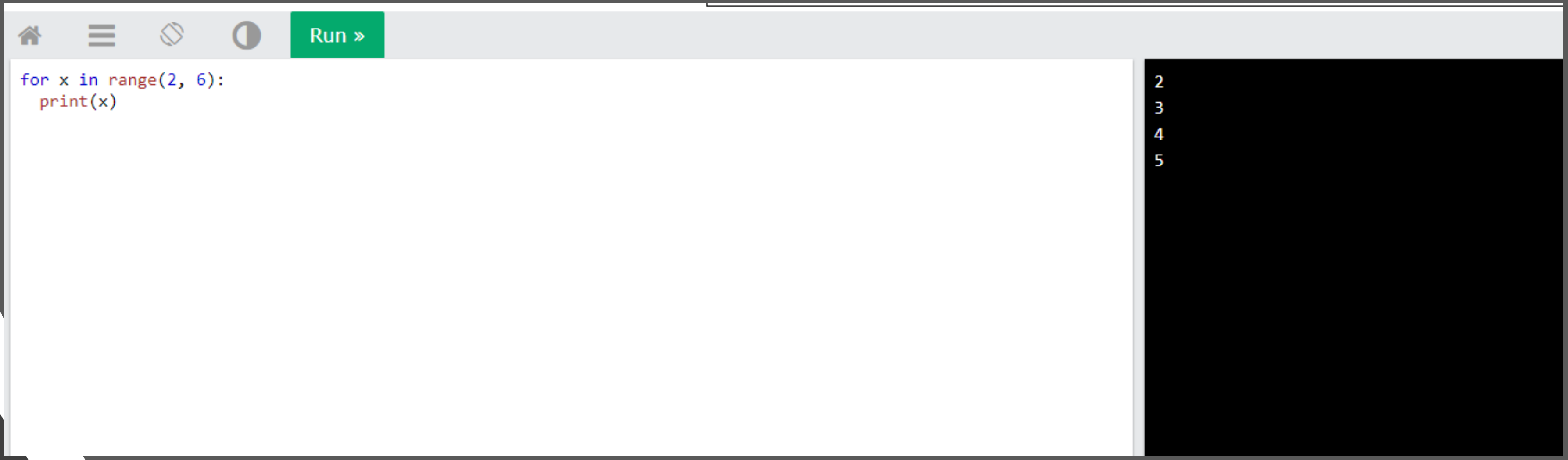


```
for x in range(6):
  print(x)
```

```
0
1
2
3
4
5
```

## For Loop

The range() function defaults to 0 as a starting value, however it is possible to specify the starting value by adding a parameter: range(2, 6), which means values from 2 to 6 (but not including 6):

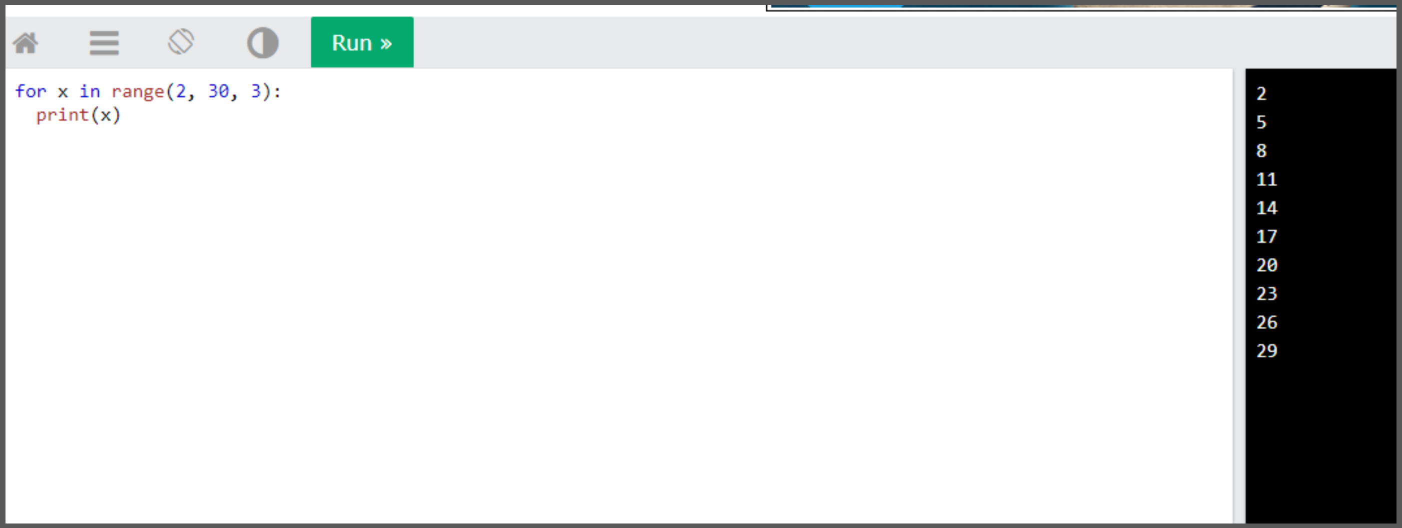


```python
for x in range(2, 6):
  print(x)
```

```
2
3
4
5
```

## For Loops

The range() function defaults to increment the sequence by 1, however it is possible to specify the increment value by adding a third parameter: range(2, 30, 3):

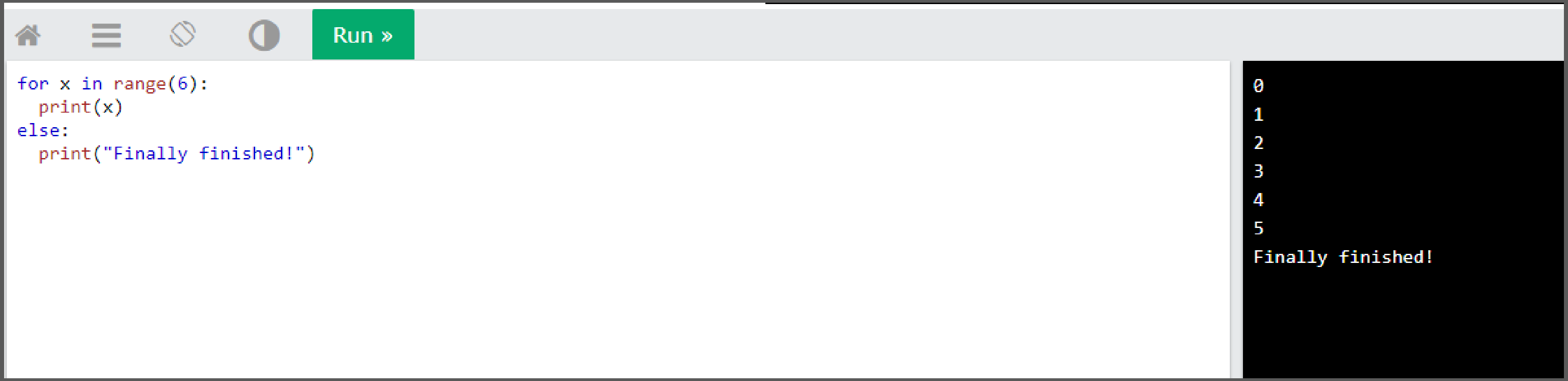


```python
for x in range(2, 30, 3):
  print(x)
```

```
2
5
8
11
14
17
20
23
26
29
```

## For Loop

The else keyword in a for loop specifies a block of code to be executed when the loop is finished:
Note: The else block will NOT be executed if the loop is stopped by a break statement.



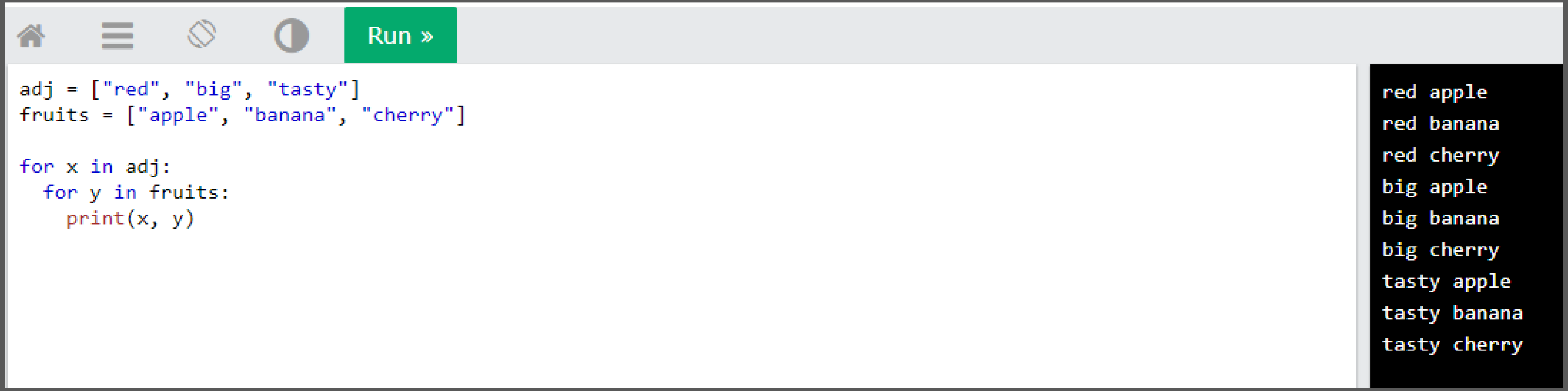
```
for x in range(6):
  print(x)
else:
  print("Finally finished!")
```

```
0
1
2
3
4
5
Finally finished!
```

# For Loops

A nested loop is a loop inside a loop.

The "inner loop" will be executed one time for each iteration of the "outer loop":



```
adj = ["red", "big", "tasty"]
fruits = ["apple", "banana", "cherry"]

for x in adj:
  for y in fruits:
    print(x, y)
```

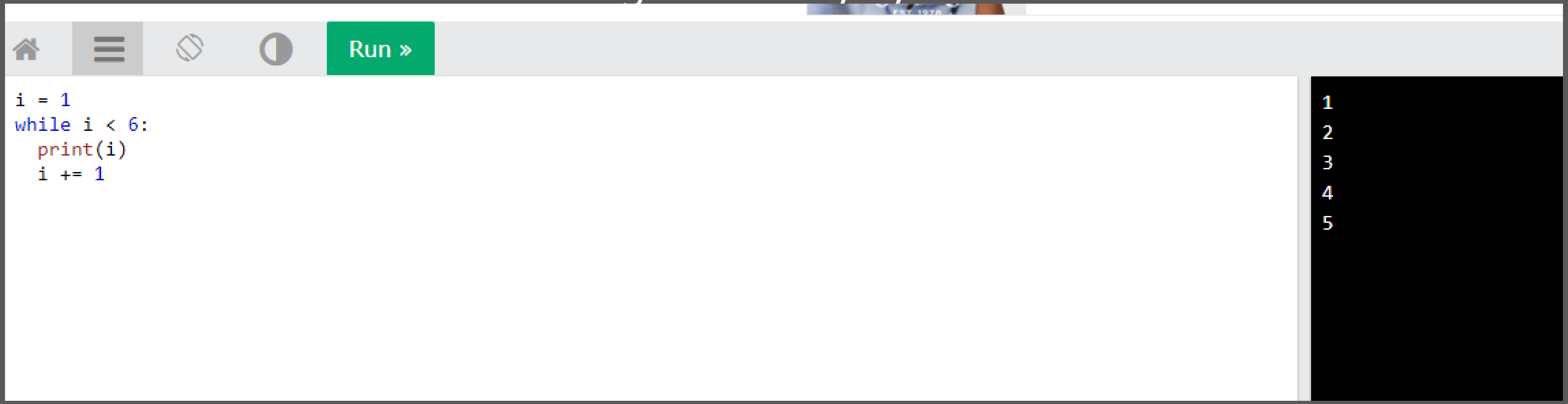
```
red apple
red banana
red cherry
big apple
big banana
big cherry
tasty apple
tasty banana
tasty cherry
```

## For Loops

for loops cannot be empty, but if you for some reason you have a for loop with no content, put in the pass statement to avoid getting an error.

# While Loops

With the while loop we can execute a set of statements as long as a condition is true.
remember to increment i, or else the loop will continue forever.
The `while` loop requires relevant variables to be ready, in this example we need to define an indexing variable, `i`, which we set to 1.

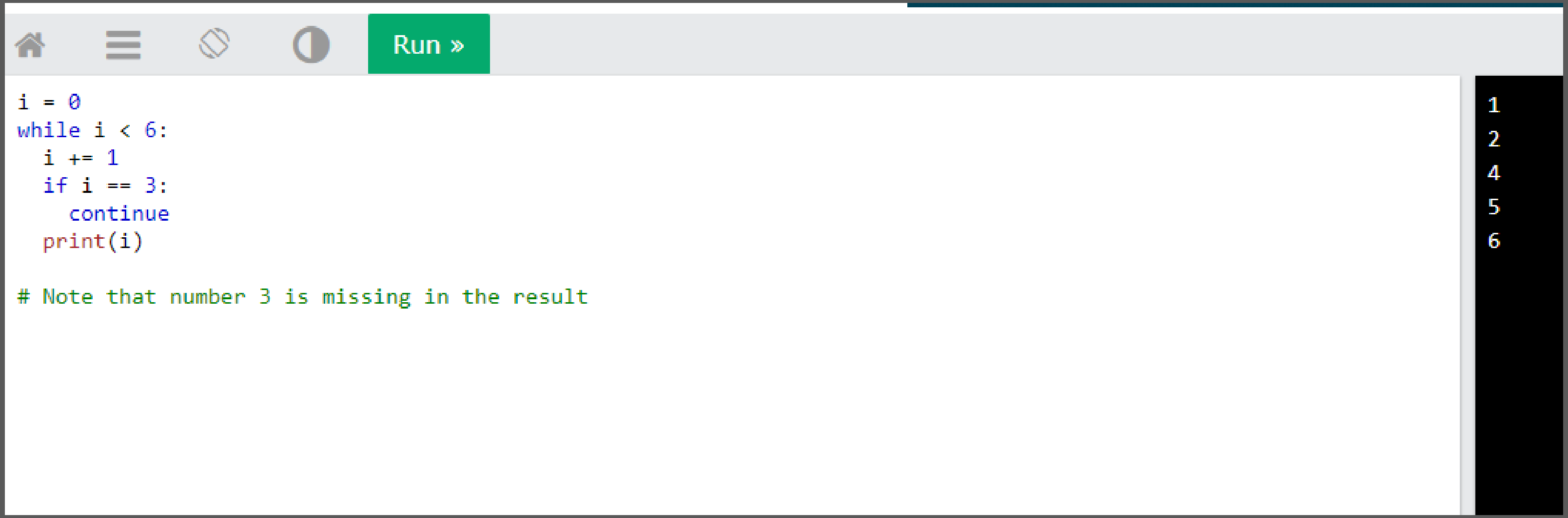


```
i = 1
while i < 6:
  print(i)
  i += 1
```

```
1
2
3
4
5
```

## While Loops

With the continue statement we can stop the current iteration, and continue with the next:



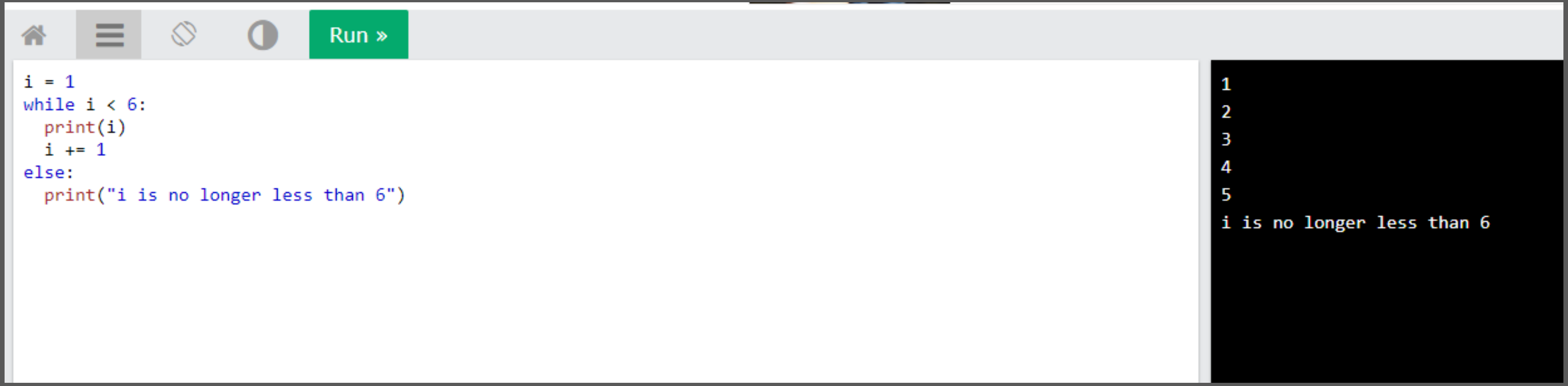
```
i = 0
while i < 6:
  i += 1
  if i == 3:
    continue
  print(i)

# Note that number 3 is missing in the result
```

```
1
2
4
5
6
```

## While Loops

With the else statement we can run a block of code once when the condition no longer is true:



```
i = 1
while i < 6:
  print(i)
  i += 1
else:
  print("i is no longer less than 6")
```

```
1
2
3
4
5
i is no longer less than 6
```

## While Loops

The While loop can be used the same way as a for loop

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The While loop can be used the same way as a for loop