Official python documentation

<https://docs.python.org/3/>

First Programming Concepts Cheat Sheet

Functions and Keywords

Functions and keywords are the building blocks of a language’s syntax.

Functions are pieces of code that perform a unit of work. In the examples we've seen so far, we've only encountered the print() function, which prints a message to the screen. We'll learn about a lot of other functions in later lessons but, if you're too curious to wait until then, you can discover all the functions available [here](https://docs.python.org/3/library/functions.html).

Keywords are reserved words that are used to construct instructions. We briefly encountered for and in in our first Python example, and we'll use a bunch of other keywords as we go through the course. For reference, these are all the reserved keywords:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| False | class | finally | is | return |
| None | continue | for | lambda | try |
| True | def | from | nonlocal | while |
| and | del | global | not | with |
| as | elif | if | or | yield |
| assert | else | import | pass |  |
| break | except | in | raise |  |

You don't need to learn this list; we'll dive into each keyword as we encounter them. In the meantime, you can see examples of keyword usage [here](https://www.programiz.com/python-programming/keyword-list).

Arithmetic operators

Python can operate with numbers using the usual mathematical operators, and some special operators, too. These are all of them (we'll explore the last two in later videos).

* **a + b** = Adds a and b
* **a - b** = Subtracts b from a
* **a \* b** = Multiplies a and b
* **a / b** = Divides a by b
* **a \*\* b** = Elevates a to the power of b. For non integer values of b, this becomes a root (i.e. a\*\*(1/2) is the square root of a)
* **a // b** = The integer part of the integer division of a by b
* **a % b** = The remainder part of the integer division of a by b

Conditionals Cheat Sheet

Comparison operators

* a == b: a is equal to b
* a != b: a is different than b
* a < b: a is smaller than b
* a <= b: a is smaller or equal to b
* a > b: a is bigger than b
* a >= b: a is bigger or equal to b

Logical operators

* a and b: True if both a and b are True. False otherwise.
* a or b: True if either a or b or both are True. False if both are False.
* not a: True if a is False, False if a is True.

**Branching blocks**

In Python, we branch our code using if, else and elif. This is the branching syntax:

if condition1:

    if-block

elif condition2:

    elif-block

else:

    else-block

Remember: The if-block will be executed if condition1 is True. The elif-block will be executed if condition1 is False and condition2 is True. The else block will be executed when all the specified conditions are false.

## Loops Cheat Sheet

Check out below for a run down of the syntax for while loops and for loops.

### While Loops

A while loop executes the body of the loop while the condition remains True.

Syntax:

while condition:

    body

Things to watch out for!

* **Failure to initialize variables.** Make sure all the variables used in the loop’s condition  are initialized before the loop.
* **Unintended infinite loops.** Make sure that the body of the loop modifies the variables used in the condition, so that the loop will eventually end **for all possible values of the variables.**

Typical use:

While loops are mostly used when there’s an unknown number of operations to be performed, and a condition needs to be checked at each iteration.

### For Loops

A for loop iterates over a sequence of elements, executing the body of the loop for each element in the sequence.

Syntax:

for variable in sequence

    body

**The range() function:**

range() generates a sequence of integer numbers. It can take one, two, or three parameters:

* range(n): 0, 1, 2, ... n-1
* range(x,y): x, x+1, x+2, ... y-1
* range(p,q,r): p, p+r, p+2r, p+3r, ... q-1 (if it's a valid increment)

**Common pitfalls:**

* **Forgetting that the upper limit of a range() isn’t included.**
* **Iterating over non-sequences.** Integer numbers aren’t iterable. Strings are iterable letter by letter, but that might not be what you want.

Typical use:

For loops are mostly used when there's a pre-defined sequence or range of numbers to iterate.

### Break & Continue

You can interrupt both while and for loops using the break keyword. We normally do this to interrupt a cycle due to a separate condition.

You can use the continue keyword to skip the current iteration and continue with the next one. This is typically used to jump ahead when some of the elements of the sequence aren’t relevant.

If you want to learn more, check out this [wiki page on for loops](https://wiki.python.org/moin/ForLoop).

## String Reference Cheat Sheet

In Python, there are a lot of things you can do with strings. In this cheat sheet, you’ll find the most common string operations and string methods.

### String operations

* len(string) Returns the length of the string
* for character in string Iterates over each character in the string
* if substring in string Checks whether the substring is part of the string
* string[i] Accesses the character at index i of the string, starting at zero
* string[i:j] Accesses the substring starting at index i, ending at index j-1. If i is omitted, it's 0 by default. If j is omitted, it's len(string) by default.

### String methods

* string.lower() / string.upper() Returns a copy of the string with all lower / upper case characters
* string.lstrip() / string.rstrip() / string.strip() Returns a copy of the string without left / right / left or right whitespace
* string.count(substring) Returns the number of times substring is present in the string
* string.isnumeric() Returns True if there are only numeric characters in the string. If not, returns False.
* string.isalpha() Returns True if there are only alphabetic characters in the string. If not, returns False.
* string.split() / string.split(delimiter) Returns a list of substrings that were separated by whitespace / delimiter
* string.replace(old, new) Returns a new string where all occurrences of old have been replaced by new.
* delimiter.join(list of strings) Returns a new string with all the strings joined by the delimiter

Check out the official documentation for [all available String methods](https://docs.python.org/3/library/stdtypes.html#string-methods).

## Formatting Strings Cheat Sheet

Python offers different ways to format strings. In the video, we explained the format() method. In this reading, we'll highlight three different ways of formatting strings. For this course you only need to know the format() method. But on the internet, you might find any of the three, so it's a good idea to know that the others exist.

### Using the format() method

The format method returns a copy of the string where the {} placeholders have been replaced with the values of the variables. These variables are converted to strings if they weren't strings already. Empty placeholders are replaced by the variables passed to format in the same order.



If the placeholders indicate a number, they’re replaced by the variable corresponding to that order (starting at zero).



f the placeholders indicate a field name, they’re replaced by the variable corresponding to that field name. This means that parameters to format need to be passed indicating the field name.

# "{var1} {var2}".format(var1=value1, var2=value2)

"{:exp1} {:exp2}".format(value1, value2)

If the placeholders include a colon, what comes after the colon is a formatting expression. See below for the expression reference.

Official documentation for [the format string syntax](https://docs.python.org/3/library/string.html#formatstrings)

# {:d} integer value

'{:d}'.format(10.5) → '10'

### Formatting expressions

| **Expr** | **Meaning** | **Example** |
| --- | --- | --- |
| {:d} | integer value | '{:d}'.format(10.5) → '10' |
| {:.2f} | floating point with that many decimals | '{:.2f}'.format(0.5) → '0.50' |
| {:.2s} | string with that many characters | '{:.2s}'.format('Python') → 'Py' |
| {:<6s} | string aligned to the left that many spaces | '{:<6s}'.format('Py') → 'Py    ' |
| {:>6s} | string aligned to the right that many spaces | '{:>6s}'.format('Py') → '    Py' |
| {:^6s} | string centered in that many spaces | '{:^6s}'.format('Py') → '  Py ' |

Check out the official documentation for [all available expressions](https://docs.python.org/3/library/string.html#format-specification-mini-language).

### Old string formatting (Optional)

The format() method was introduced in Python 2.6. Before that, the % (modulo) operator could be used to get a similar result. While this method is **no longer recommended** for new code, you might come across it in someone else's code. This is what it looks like:

"base string with %s placeholder" % variable

The % (modulo) operator returns a copy of the string where the placeholders indicated by %  followed by a formatting expression are replaced by the variables after the operator.

"base string with %d and %d placeholders" % (value1, value2)

To replace more than one value, the values need to be written between parentheses. The formatting expression needs to match the value type.

"%(var1) %(var2)" % {var1:value1, var2:value2}

Variables can be replaced by name using a dictionary syntax (we’ll learn about dictionaries in an upcoming video).

"Item: %s - Amount: %d - Price: %.2f" % (item, amount, price)

The formatting expressions are mostly the same as those of the format() method.

Check out the official documentation for [old string formatting](https://docs.python.org/3/library/stdtypes.html#old-string-formatting).

### Formatted string literals (Optional)

This feature was added in Python 3.6 and isn’t used a lot yet. Again, it's included here in case you run into it in the future, but it's not needed for this or any upcoming courses.

A formatted string literal or f-string is a string that starts with 'f' or 'F' before the quotes. These strings might contain {} placeholders using expressions like the ones used for format method strings.

The important difference with the format method is that it takes the value of the variables from the current context, instead of taking the values from parameters.

Examples:

>>> name = "Micah"

>>> print(f'Hello {name}')

Hello Micah

>>> item = "Purple Cup"

>>> amount = 5

>>> price = amount \* 3.25

>>> print(f'Item: {item} - Amount: {amount} - Price: {price:.2f}')

Item: Purple Cup - Amount: 5 - Price: 16.25

Check out the official documentation for [f-strings](https://docs.python.org/3/reference/lexical_analysis.html#f-strings).

## Lists and Tuples Operations Cheat Sheet

Lists and tuples are both sequences, so they share a number of sequence operations. But, because lists are mutable, there are also a number of methods specific just to lists. This cheat sheet gives you a run down of the common operations first, and the list-specific operations second.

### Common sequence operations

* len(sequence) Returns the length of the sequence
* for element in sequence Iterates over each element in the sequence
* if element in sequence Checks whether the element is part of the sequence
* sequence[i] Accesses the element at index i of the sequence, starting at zero
* sequence[i:j] Accesses a slice starting at index i, ending at index j-1. If i is omitted, it's 0 by default. If j is omitted, it's len(sequence) by default.
* for index, element in enumerate(sequence) Iterates over both the indexes and the elements in the sequence at the same time

Check out the [official documentation for sequence operations](https://docs.python.org/3/library/stdtypes.html#sequence-types-list-tuple-range).

### List-specific operations and methods

* list[i] = x Replaces the element at index i with x
* list.append(x) Inserts x at the end of the list
* list.insert(i, x) Inserts x at index i
* list.pop(i) Returns the element a index i, also removing it from the list. If i is omitted, the last element is returned and removed.
* list.remove(x) Removes the first occurrence of x in the list
* list.sort() Sorts the items in the list
* list.reverse() Reverses the order of items of the list
* list.clear() Removes all the items of the list
* list.copy() Creates a copy of the list
* list.extend(other\_list) Appends all the elements of other\_list at the end of list

Most of these methods come from the fact that lists are mutable sequences. For more info, see the [official documentation for mutable sequences](https://docs.python.org/3/library/stdtypes.html#mutable-sequence-types) and the [list specific documentation](https://docs.python.org/3/library/stdtypes.html#lists).

### List comprehension

* [expression for variable in sequence] Creates a new list based on the given sequence. Each element is the result of the given expression.
* [expression for variable in sequence if condition] Creates a new list based on the given sequence. Each element is the result of the given expression; elements only get added if the condition is true.

## Dictionary Methods Cheat Sheet

**Definition**

x = {key1:value1, key2:value2}

**Operations**

* len(dictionary) - Returns the number of items in the dictionary
* for key in dictionary - Iterates over each key in the dictionary
* for key, value in dictionary.items() - Iterates over each key,value pair in the dictionary
* if key in dictionary - Checks whether the key is in the dictionary
* dictionary[key] - Accesses the item with key key of the dictionary
* dictionary[key] = value - Sets the value associated with key
* del dictionary[key] - Removes the item with key key from the dictionary

**Methods**

* dict.get(key, default) - Returns the element corresponding to key, or default if it's not present
* dict.keys() - Returns a sequence containing the keys in the dictionary
* dict.values() - Returns a sequence containing the values in the dictionary
* dict.update(other\_dictionary) - Updates the dictionary with the items coming from the other dictionary. Existing entries will be replaced; new entries will be added.
* dict.clear() - Removes all the items of the dictionary

Check out the [official documentation for dictionary operations and methods](https://docs.python.org/3/library/stdtypes.html#mapping-types-dict).