UNIVERSITY *of* WASHINGTON

# Software Design for Data Science

## Function Interface Specification

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## Function Interfaces

What someone needs to know to use a function:

- What does it do?
- How do I call it?
- What do I get it response?
- What can go wrong?

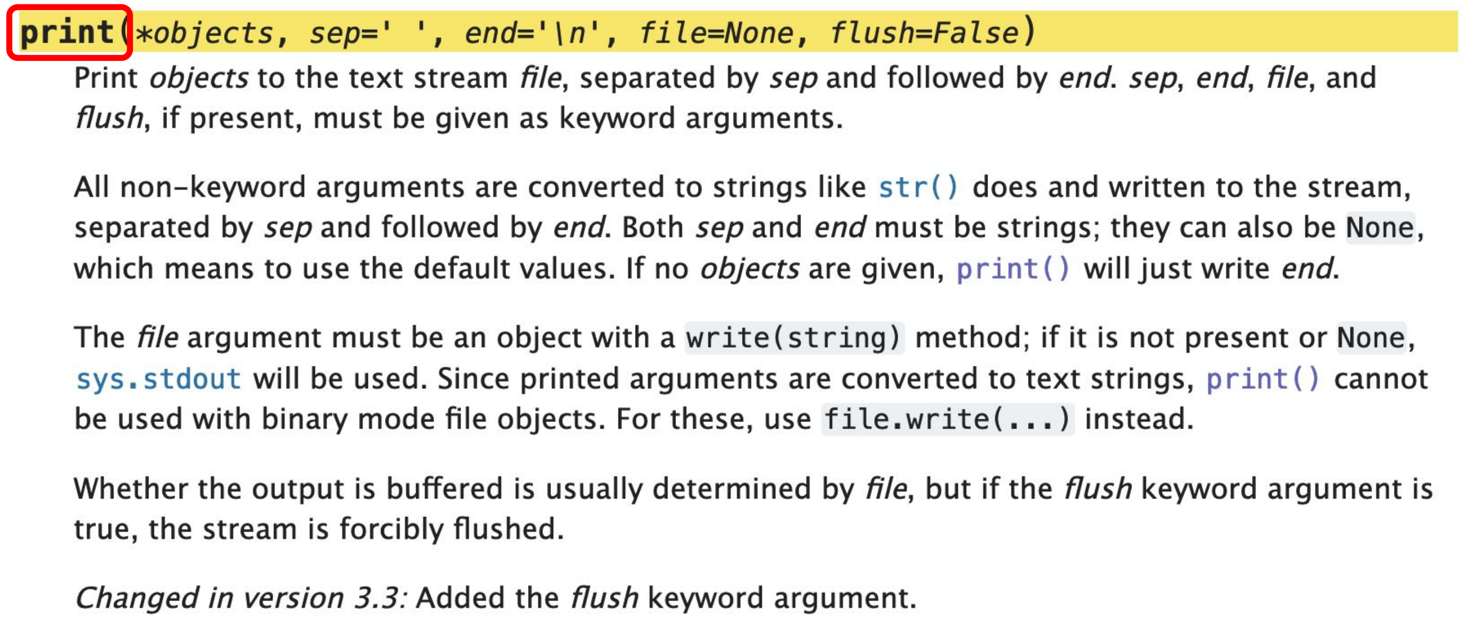
## Function Interfaces

What someone needs to know to use a function:

- Name
- Arguments
- Return values
- Side effects
- Edge cases
- Exceptions (next week!)
- Examples (optional)

## Function name

- Duh
- So someone can use the function



`print(*objects, sep=' ', end='\n', file=None, flush=False)`

Print *objects* to the text stream *file*, separated by *sep* and followed by *end*. *sep*, *end*, *file*, and *flush*, if present, must be given as keyword arguments.

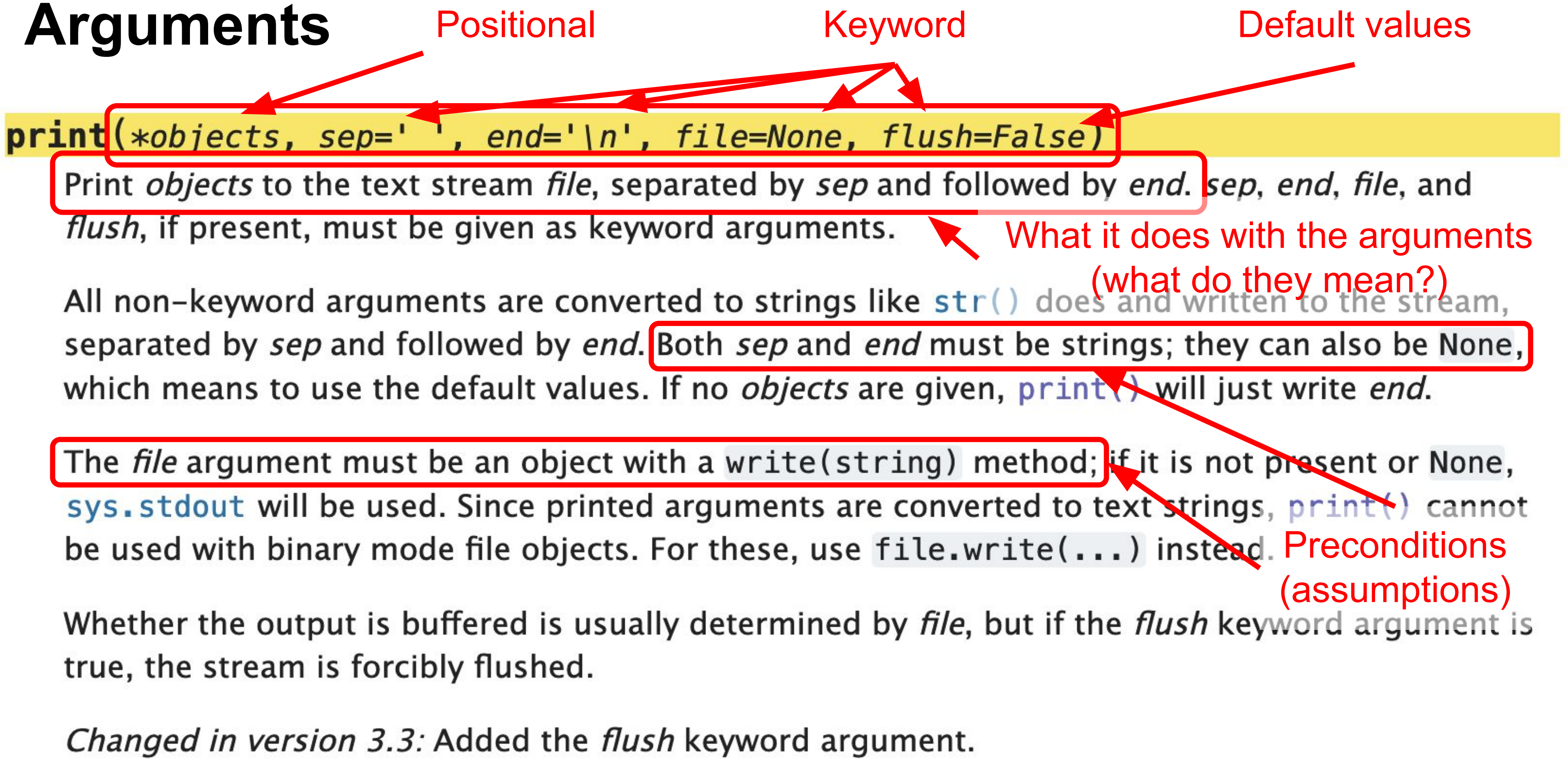
All non-keyword arguments are converted to strings like `str()` does and written to the stream, separated by *sep* and followed by *end*. Both *sep* and *end* must be strings; they can also be `None`, which means to use the default values. If no *objects* are given, `print()` will just write *end*.

The *file* argument must be an object with a `write(string)` method; if it is not present or `None`, `sys.stdout` will be used. Since printed arguments are converted to text strings, `print()` cannot be used with binary mode file objects. For these, use `file.write(...)` instead.

Whether the output is buffered is usually determined by *file*, but if the *flush* keyword argument is true, the stream is forcibly flushed.

*Changed in version 3.3:* Added the *flush* keyword argument.

## Arguments


Positional
Keyword
Default values
What it does with the arguments (what do they mean?)
Preconditions (assumptions)

```
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```

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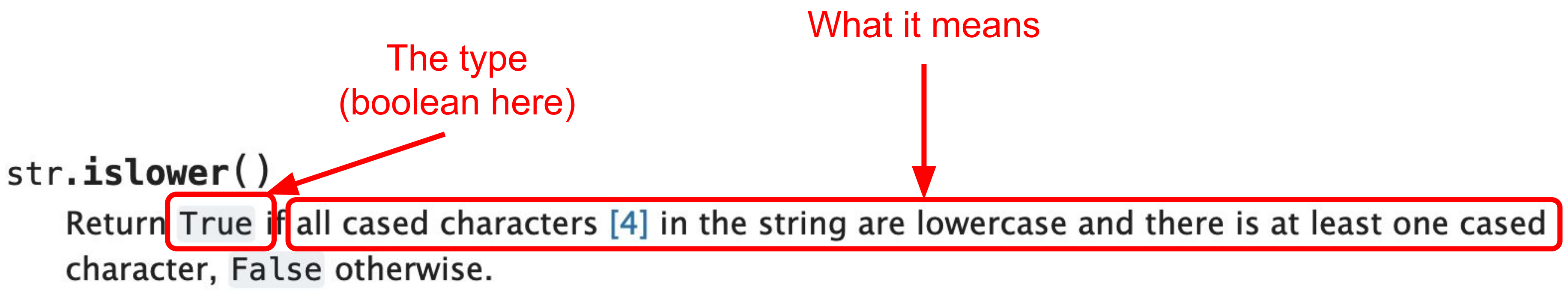
## Return values



`str.islower()`

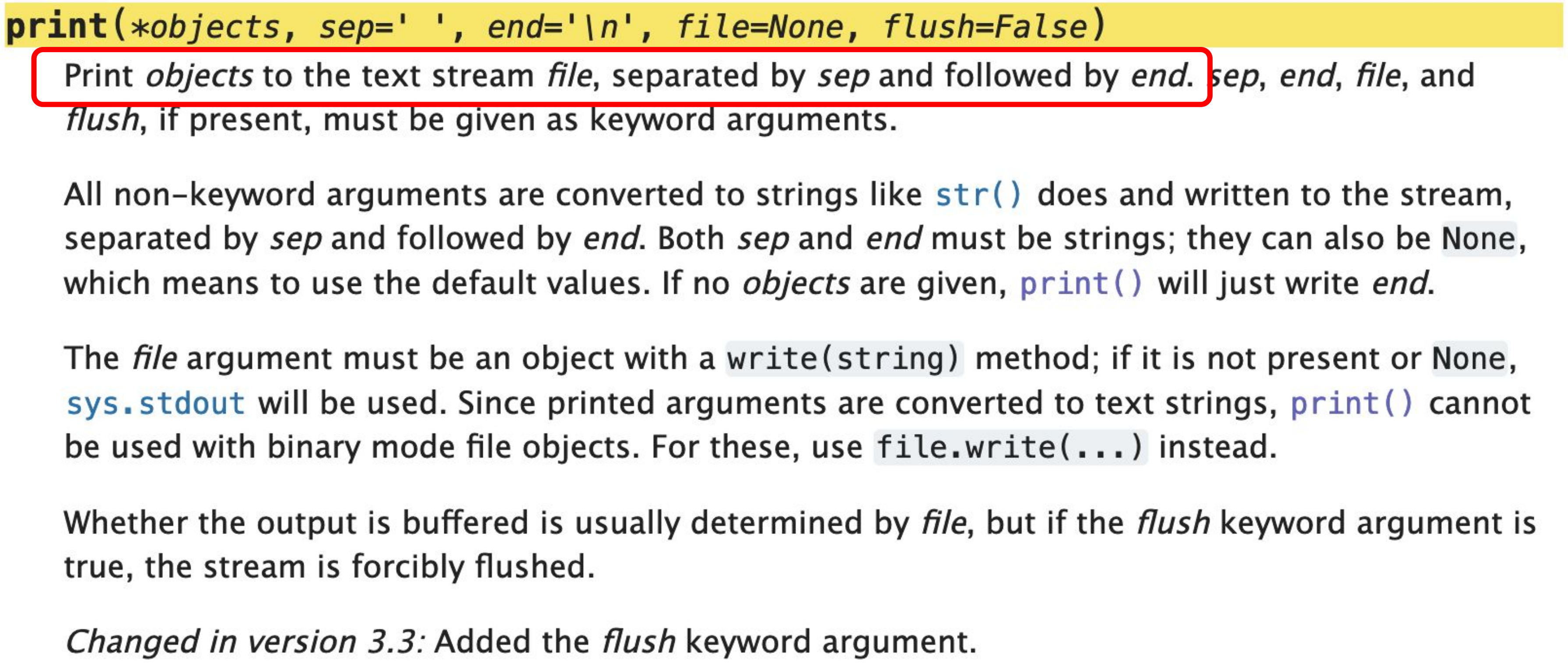
Return `True` if all cased characters [4] in the string are lowercase and there is at least one cased character, `False` otherwise.

## Side effects

- Printing something
- Changing a mutable argument (lists, dictionaries, sets, etc)
- Changing a global variable
- File operations (creating/deleting/moving/etc)

Be specific!

## Side effect example: print()



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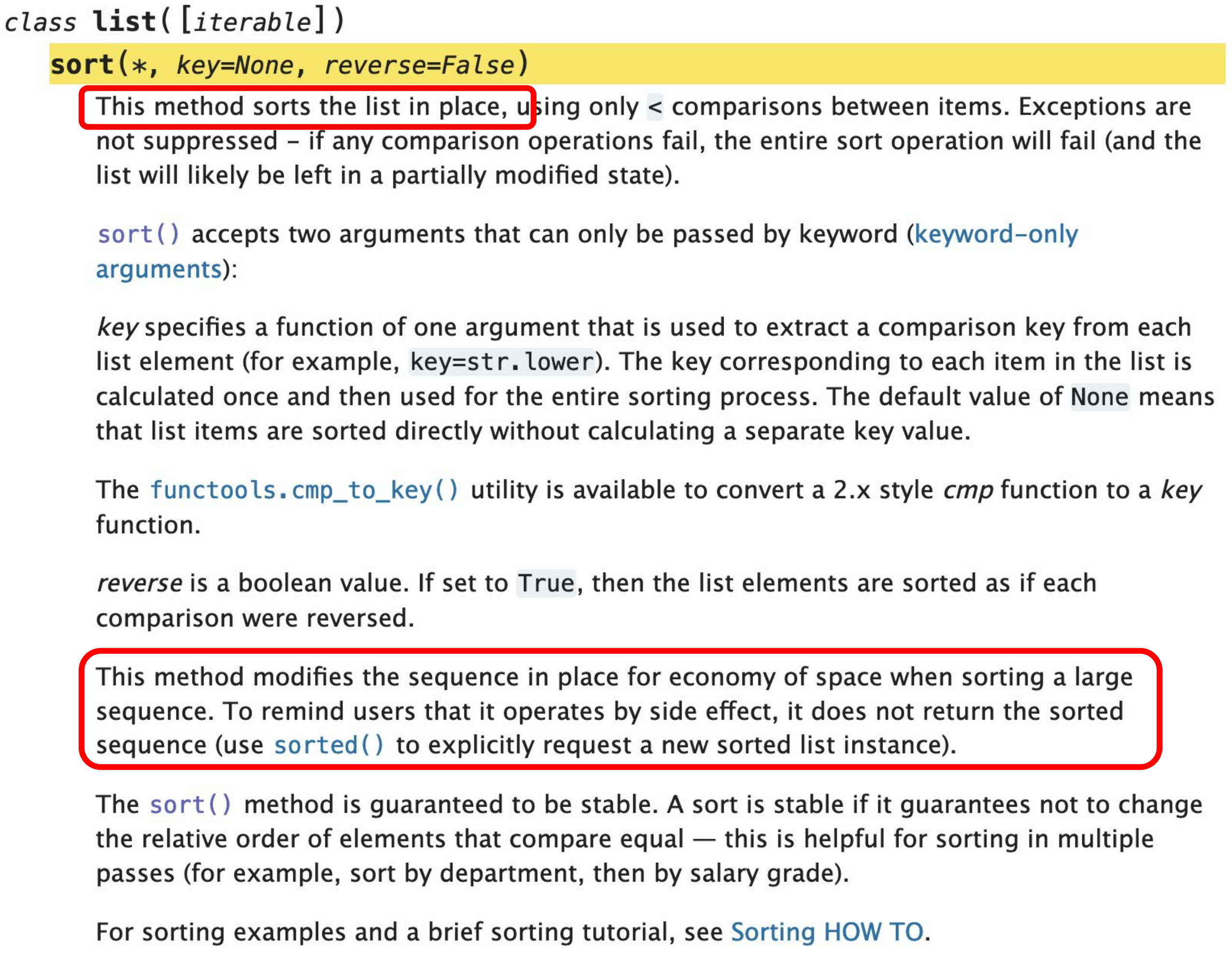
## Side effect example: list.sort()



`class list([iterable])`

`sort(*, key=None, reverse=False)`

This method sorts the list in place, using only `<` comparisons between items. Exceptions are not suppressed – if any comparison operations fail, the entire sort operation will fail (and the list will likely be left in a partially modified state).

`sort()` accepts two arguments that can only be passed by keyword (keyword-only arguments):

*key* specifies a function of one argument that is used to extract a comparison key from each list element (for example, `key=str.lower`). The key corresponding to each item in the list is calculated once and then used for the entire sorting process. The default value of `None` means that list items are sorted directly without calculating a separate key value.

The `functools.cmp_to_key()` utility is available to convert a 2.x style *cmp* function to a *key* function.

*reverse* is a boolean value. If set to `True`, then the list elements are sorted as if each comparison were reversed.

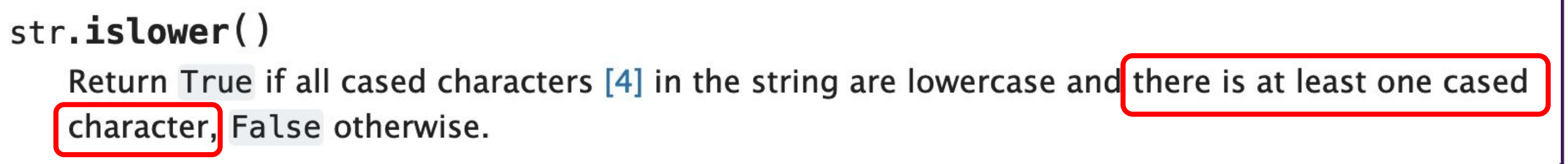
This method modifies the sequence in place for economy of space when sorting a large sequence. To remind users that it operates by side effect, it does not return the sorted sequence (use `sorted()` to explicitly request a new sorted list instance).

The `sort()` method is guaranteed to be stable. A sort is stable if it guarantees not to change the relative order of elements that compare equal — this is helpful for sorting in multiple passes (for example, sort by department, then by salary grade).

For sorting examples and a brief sorting tutorial, see Sorting HOW TO.

## Edge cases

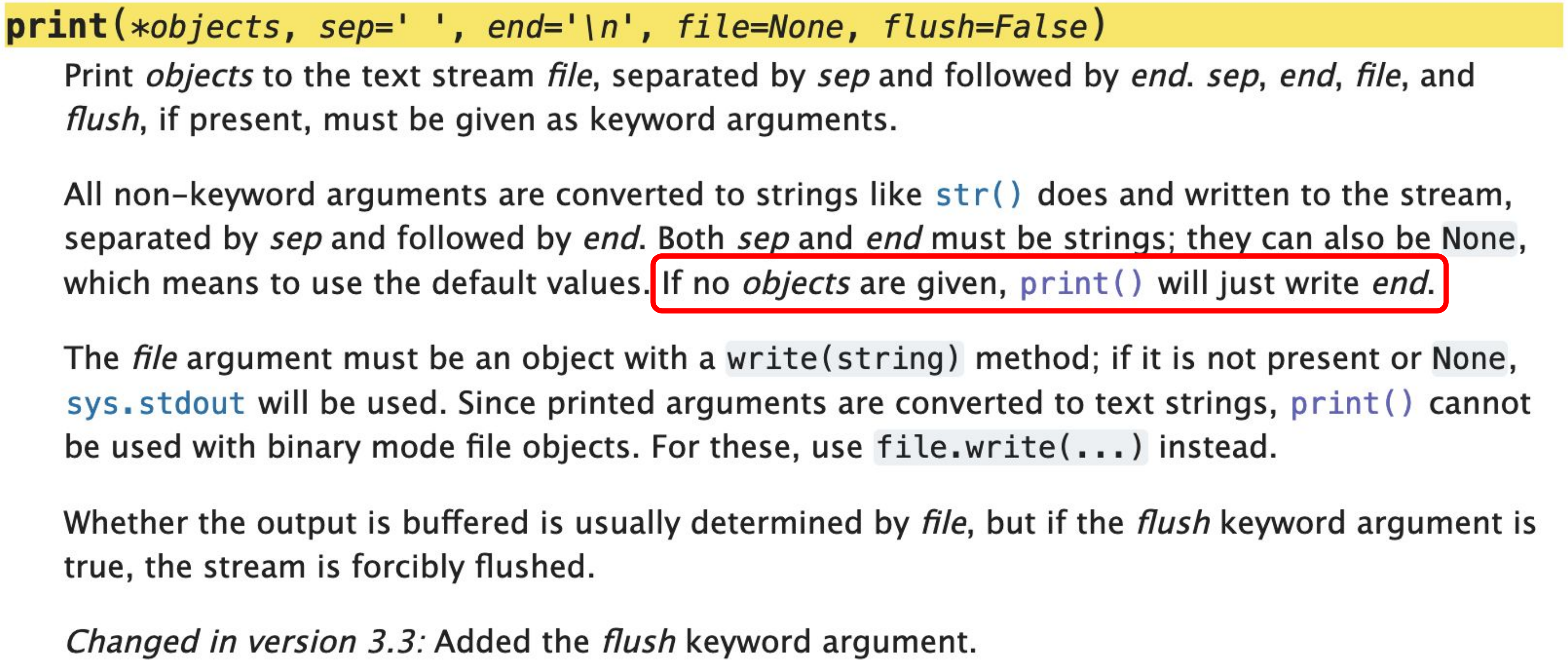
- Things to watch out for



`str.islower()`

Return `True` if all cased characters [4] in the string are lowercase and there is at least one cased character, `False` otherwise.

## Edge case example: print()



```
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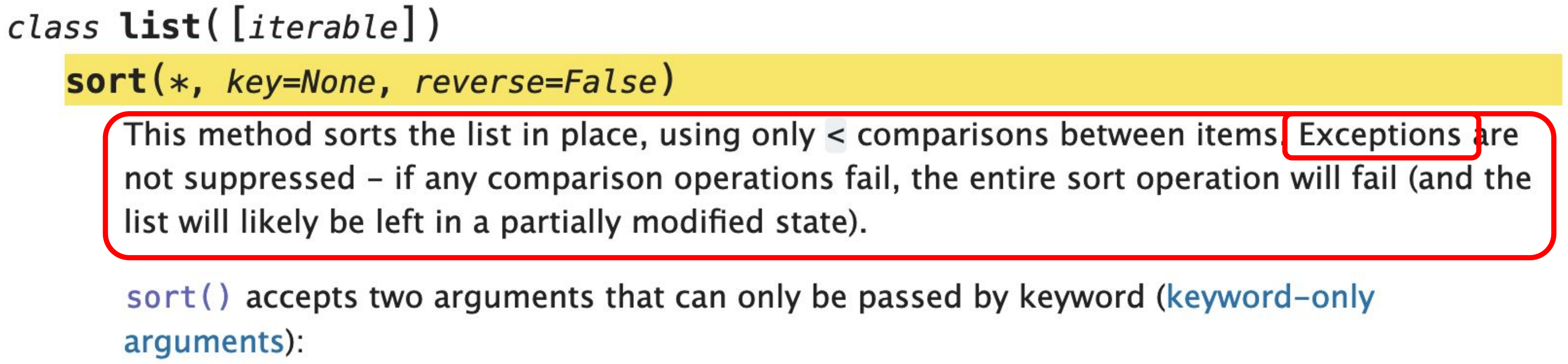
## Exceptions

- When preconditions aren’t satisfied (arguments are bad)
- When something goes wrong, what happens?

  … next week



*class* **list**([*iterable*])

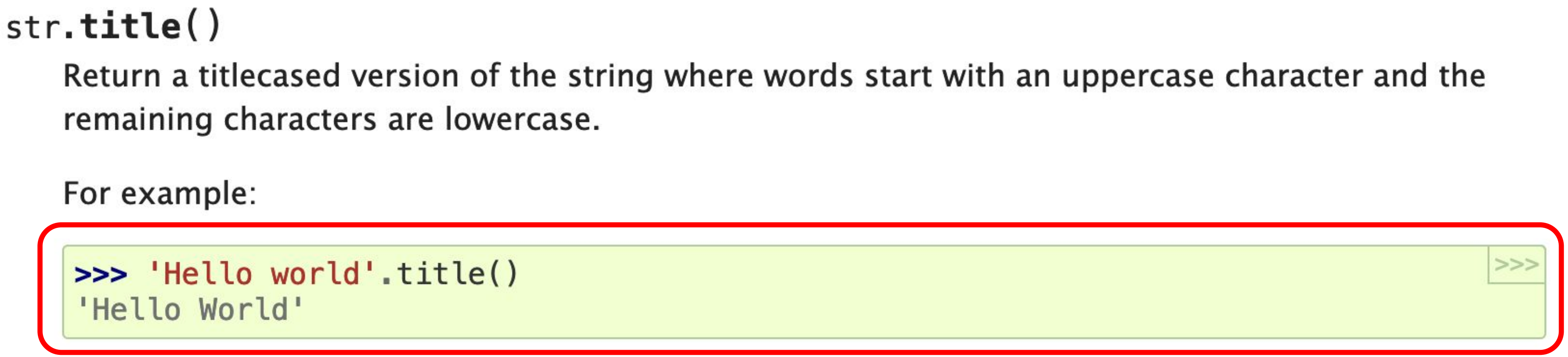
**sort**(*, *key=None*, *reverse=False*)

This method sorts the list in place, using only `<` comparisons between items. Exceptions are not suppressed – if any comparison operations fail, the entire sort operation will fail (and the list will likely be left in a partially modified state).

`sort()` accepts two arguments that can only be passed by keyword (keyword-only arguments):

## Examples

Help people understand how to use the function



`str.title()`

Return a titlecased version of the string where words start with an uppercase character and the remaining characters are lowercase.

For example:

```
>>> 'Hello world'.title()
'Hello World'
```

## Function Interfaces

What someone needs to know to use a function:

- Name
- Arguments
- Return values
- Side effects
- Edge cases
- Exceptions (next week!)
- Examples (optional)

## Why do we care?

- Reading standard types of documentation
- Reading homework instructions
- Writing your own for projects
  - Collaboration - if you agree on function interfaces, you can start writing code that uses the interface even if it isn’t written yet!
  - Recommendation: start with the interfaces