Using Code Libraries

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CodeGraf landing page

- vanderbi.lt/codegraf

Importing a function

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Standard Library modules

- A **module** is:
  - reusable code stored in a separate file (has `.py` extension like other Python programs)
  - loaded into script using the `import` statement
- Modules in the **Standard Library** are:
  - included automatically when Python is installed
  - hidden away somewhere deep in your installation
- **Functions** in Standard Library modules are:
  - not automatically available like built-in functions
  - always available if the module is **imported**.

Import options: math module example

- Import a single function from the module

```
from math import sqrt
answer = sqrt(3)
```

- Import the whole module

```
import math
answer = math.sqrt(3)
```

- Import the module and abbreviate

```
import math as m
answer = m.sqrt(3)
```

Methods

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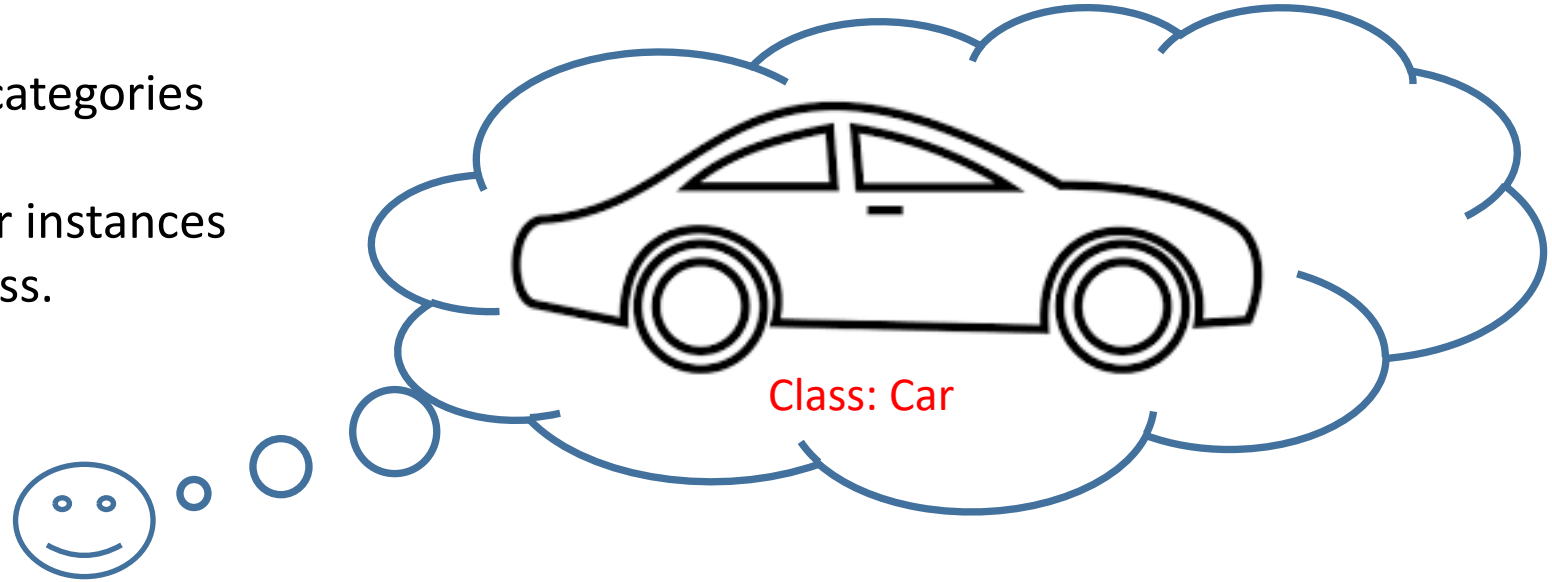
classes and objects

Classes are abstract categories of things.
Objects are particular instances or individuals of a class.



object: toyotaPrius

object: ferrari

object: volkswagenBeetle

Methods

- Methods are essentially **functions** tied to a class.
- We can apply a method to any **object** that is an instance of the class that the method is associated with.
- Method names follow the object name, separated by a dot, followed by parentheses.
- Like functions, methods may or may not return any value.
- Example: class **`Car`** has methods **`.drive()`** and **`.accelerate()`**

```
toyotaPrius.drive('Nashville')
```

doesn't return a value.

```
newSpeed = toyotaPrius.accelerate(15)
```

returns a value.

Method example

- Built-in string class **`str`** has method **`.upper()`**
- Example:

```
my_message = 'Do not yell at me!'
shouting = my_message.upper()
print(shouting)
```

- The method has no arguments; it operates on the object.
- This method return value is the string in uppercase.

Points of confusion

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Is it a function from a module or a method?

- If you see this in somebody else's code:

```
something.otherthing()
```

- is it:
  1. the **`otherthing()`** function from the **`something`** module?
  2. an **`.otherthing()`** method operating on the **`something`** object?

```
1. import something
```

```
2. something = something_else
```

List objects

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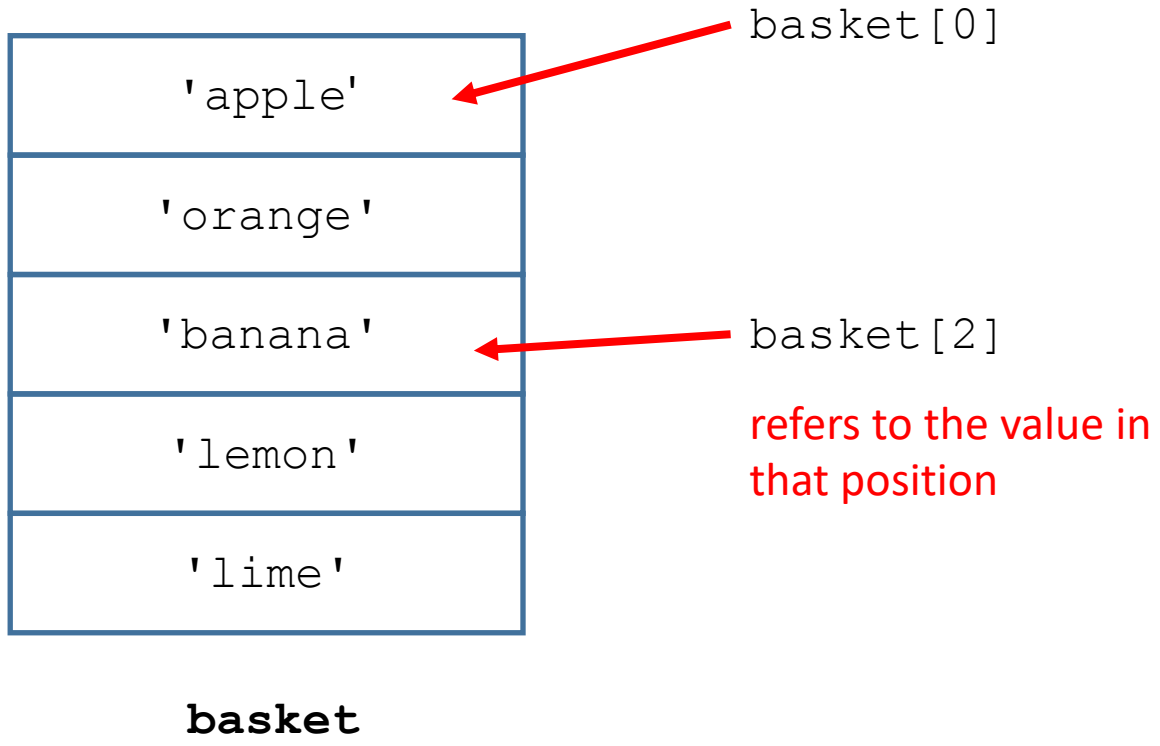
List objects

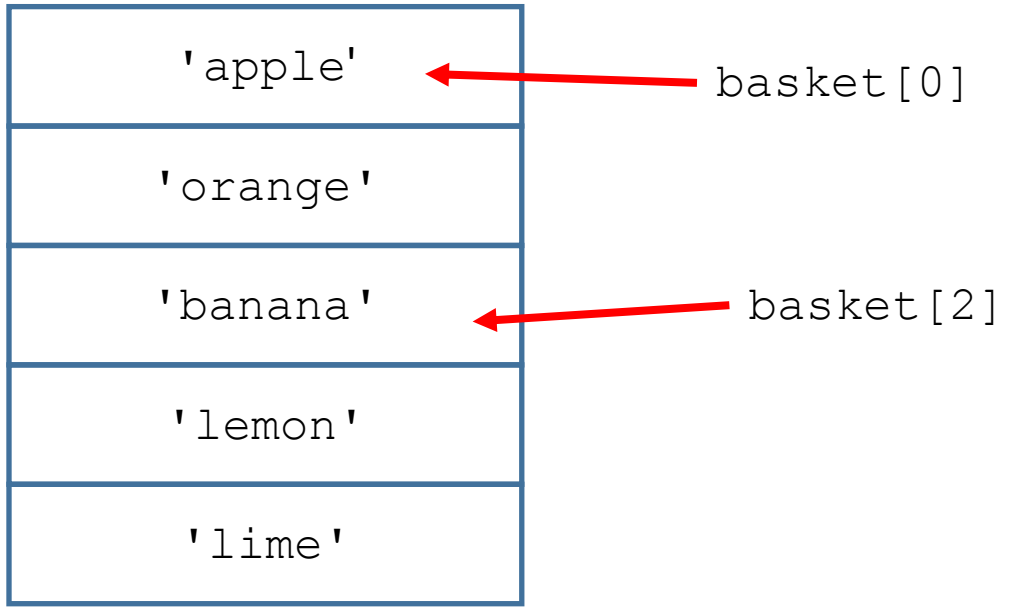
- A list object is a one-dimensional data structure
- Lists can hold any other kind of object.
- The items in a list are referred to by an index number (0-based)



Instantiating a list

- A list can be constructed directly by listing its contents.
- The type of the list is different from the type of items the list contains.
- List items don't have to all be of the same type (but often are).

```
basket = ['apple', 'orange', 'banana', 'lemon', 'lime']
```



Finding the length of a list

- The **`len()`** function will return the number of items in a list
- Example:

```
basket = ['apple', 'orange', 'banana', 'lemon', 'lime']
print(len(basket))
```

- Item indices range from 0 to 4
- Length is 5 (the actual count)
- In many ways, a string is like a list of characters; **`len()`** works for it

Other ways to make a list

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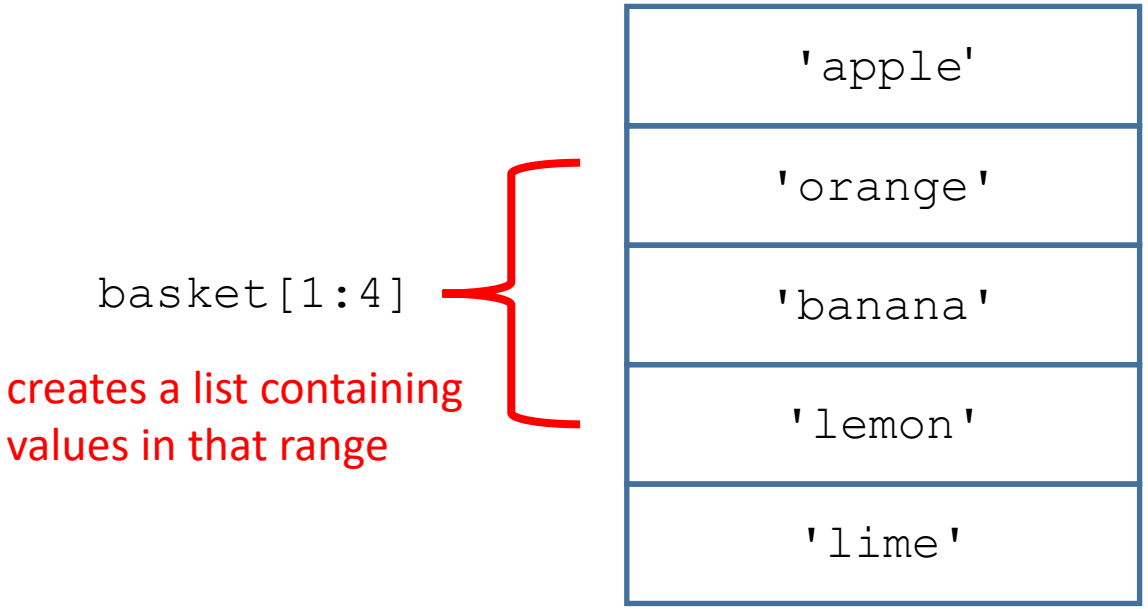
Output of functions or methods

- The output of a function or method may be a list:
  - **`os.listdir()`** function
  - **`random.sample()`** function
  - **`.split()`** string method

Slicing a list

- A range is given instead of a single index
- Start of range is zero-based.
- End of range is one less than ending index.
- Slicing generates another list



Aside: slicing a string

- Since a string is like a list of characters, we can slice it in the same way
- Example:

```
a_word = 'Mississippi'
word_piece = a_word[1:4]
```

- Range is from 1 to 4
- Slice goes from letters 1 to 3 (start counting with 0)
- Answer: `'iss'`

Useful things to do with lists

- Randomize a list
  - **`random.shuffle()`** function
- Sort a list
  - **`.sort()`** list method
- Pick an item from a list
  - **`random.choice()`** function

Changing a list

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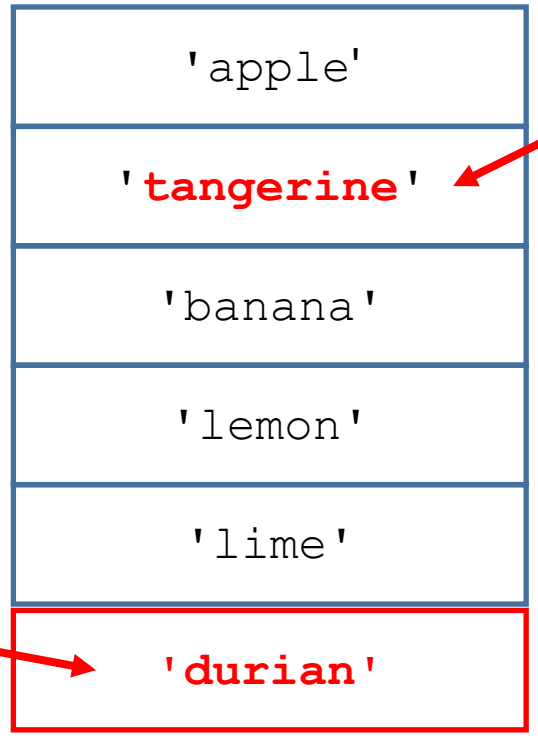
Editing lists

```
basket = ['apple', 'orange', 'banana', 'lemon', 'lime']
```

```
basket[1] = 'tangerine'
```

We can assign a new value to any list item.




```
basket.append('durian')
```

The `.append()` method does not return a value – it changes the list.

More commands for editing lists

- An **empty list** can be created using

```
basket = []
```

- `.remove()` can be used to remove a **particular value** from the list.
- `del basket[3]` can be used to remove an **item by position**

- The **+** operator appends the items in the second list to the end of the first list.

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