Exercise: Classes and Objects

This document defines the exercises for the "Python Fundamentals" course at @SoftUni Global

Note: Submit only the classes in the judge system for all tasks. Test your classes with your code to see if they work correctly.

1. Storage

Create a **class `Storage`**. The **`__init__`** method should accept **one parameter** - the **`capacity`** of the storage. The Storage class should also have an attribute called **`storage`** - empty list, where all the items will be stored.

The class should have two additional methods:

- **`add_product(product: str)`** - adds the product in the storage **if there is enough space** for it
- **`get_products()`** - returns the storage list

Example

Test Code	Output

`storage = Storage(4)`
`storage.add_product("apple")`
`storage.add_product("banana")`
`storage.add_product("potato")`
`storage.add_product("tomato")`
`storage.add_product("bread")`
`print(storage.get_products())`
	`["apple", "banana", "potato", "tomato"]`

2. Weapon

Create a **class `Weapon`**. The **`__init__`** method should receive a number of **`bullets`** (integer). Create an attribute called **`bullets`** to store that number. The class should also have the following methods:

- **`shoot()`**
  - If there are bullets in the weapon, **reduce** them **by 1** and return a message **`"shooting..."`**
  - If there are **no bullets** left, return: **`"no bullets left"`**
- **`__repr__()`**
  - Returns **`"Remaining bullets: {amount_of_bullets}"`**
  - You can read more about the method here: link

Example

Test Code	Output

`weapon = Weapon(5)`
`print(weapon.shoot())`
`print(weapon.shoot())`
`print(weapon)`
`print(weapon.shoot())`
`print(weapon.shoot())`
`print(weapon.shoot())`
`print(weapon.shoot())`
`print(weapon)`
	`shooting...`
	`shooting...`
	`Remaining bullets: 3`
	`shooting...`
	`shooting...`
	`shooting...`
	`no bullets left`
	`Remaining bullets: 0`

3. Catalogue

Create a **class `Catalogue`**. The **`__init__`** method should accept the **`name`** of the catalogue (string). Each catalogue should also have an **attribute** called **`products`**, an empty **list**. The class should also have **three more methods**:

- **`add_product(product_name: str)`** - adds the product to the products' list
- **`get_by_letter(first_letter: str)`** - returns a **list** containing only the products that start with the given letter
- **`__repr__`** - returns the catalogue info in the following format:
  `"Items in the {name} catalogue:`
  `{item1}`
  `{item2}`
  `...`
  `{itemN}"`
  The items should be **sorted alphabetically in ascending order**.

Example

Test Code	Output

`catalogue = Catalogue("Furniture")`
`catalogue.add_product("Sofa")`
`catalogue.add_product("Mirror")`
`catalogue.add_product("Desk")`
`catalogue.add_product("Chair")`
`catalogue.add_product("Carpet")`
`print(catalogue.get_by_letter("C"))`
`print(catalogue)`
	`["Chair", "Carpet"]`
	`Items in the Furniture catalogue:`
	`Carpet`
	`Chair`
	`Desk`
	`Mirror`
	`Sofa`

4. Town

Create a **class `Town`**. The **`__init__`** method should receive the **`name`** of the town (string). Each town has a **`latitude`** - **`"0°N"`** upon initialization and a **`longitude`** - **`"0°E"`** upon initialization. It should also have **3 more methods**:

- **`set_latitude(latitude)`** - sets a **latitude**
- **`set_longitude(longitude)`** - sets a **longitude**
- **`__repr__`** - returns a representation of the object in the following string format:
  `"Town: {name} | Latitude: {latitude} | Longitude: {longitude}"`

Example

Test Code	Output

`town = Town("Sofia")`
`town.set_latitude("42° 41\' 51.04\" N")`
`town.set_longitude("23° 19\' 26.94\" E")`
`print(town)`
	`Town: Sofia | Latitude: 42° 41' 51.04" N | Longitude: 23° 19' 26.94" E`

5. Class

Create a **class `Class`**. The **`__init__`** method should receive the **`name`** of the class. Each class should also have **2 empty lists** - **`students`** and **`grades`**. Create a **class attribute `__students_count`** equal to **22**. The class should also have **3 additional methods**:

- **`add_student(name: str, grade: float)`** - **adds** the **student** and the **grade** in the two lists if there is **free space** in the class
- **`get_average_grade()`** - returns the **average** of all existing **grades** formatted to the **second decimal** point (as a **number**)
- **`__repr__`** - returns the string (**single line**):

`"The students in {class_name}: {students}. Average grade: {average_grade}"`.

The students must be separated by a comma and a space: **`", "`**.

Example

Test Code	Output

`a_class = Class("11B")`
`a_class.add_student("Peter", 4.80)`
`a_class.add_student("George", 6.00)`
`a_class.add_student("Amy", 3.50)`
`print(a_class)`
	`The students in 11B: Peter, George, Amy.`
	`Average grade: 4.77`

6. Inventory

Create a **class `Inventory`**. The **`__init__`** method should accept only the **`__capacity: int`** (private attribute) of the inventory. You can read more about private attributes **here**. Each inventory should also have an attribute called **`items`** - **empty list**, where all the items will be stored. The class should also have **3 methods**:

- **`add_item(item: str)`** - adds the item in the inventory if there is space for it. Otherwise, returns **`"not enough room in the inventory"`**
- **`get_capacity()`** - returns the value of **`__capacity`**
- **`__repr__()`** - returns **`"Items: {items}.\nCapacity left: {left_capacity}"`**. The items should be separated by **`", "`**

Example

Test Code	Output

`inventory = Inventory(2)`
`inventory.add_item("potion")`
`inventory.add_item("sword")`
`print(inventory.add_item("bottle"))`
`print(inventory.get_capacity())`
`print(inventory)`
	`not enough room in the inventory`
	`2`
	`Items: potion, sword.`
	`Capacity left: 0`

7. Articles

Create a **class** called **`Article`**. The **`__init__`** method should accept **3 arguments**: **`title: str`**, **`content: str`**, and **`author: str`**. The class should also have **4 methods**:

- **`edit(new_content: str)`** - changes the old content to the new one
- **`change_author(new_author: str)`** - changes the old author with the new one
- **`rename(new_title: str)`** - changes the old title with the new one
- **`__repr__()`** - returns the following string **`"{title} - {content}: {author}"`**

Example

Test Code	Output

`article = Article(`
`    "Highest Recorded Temperature",`
`    "Temperatures across Europe are unprecedented, according to scientists.",`
`    "Ben Turner"`
`)`
`article.edit(`
`    "Syracuse, a city on the coast of the Italian island of Sicily, registered temperatures of 48.8 degrees Celsius"`
`)`
`article.rename(`
`    "Temperature in Italy"`
`)`
`article.change_author(`
`    "B. T."`
`)`
`print(article)`
	`Temperature in Italy - Syracuse, a city on the coast of the Italian island of Sicily, registered temperatures of 48.8 degrees Celsius: B. T.`

8. * Vehicle

Create a **class `Vehicle`**. The **`__init__`** method should receive a **`type`**, a **`model`**, and a **`price`**. You should also set an **`owner`** to **None**. The class should have the following methods:

- **`buy(money: int, owner: str)`**
  - If the person **has enough money** and the vehicle has **no owner**, returns: **`"Successfully bought a {type}. Change: {change}"`** and **sets** the **owner** to the given one
  - If the **money is not enough**, return: **`"Sorry, not enough money"`**
  - If the car **already has** an **owner**, return: **`"Car already sold"`**
- **`sell()`**
  - If the car **has an owner**, set it to **None** again.
  - Otherwise, return: **`"Vehicle has no owner`**"
- **`__repr__()`**
  - If the vehicle **has** an **owner**, returns: **`"{model} {type} is owned by: {owner}"`**.
  - Otherwise, return: **`"{model} {type} is on sale: {price}"`**

Example

Test Code	Output

`vehicle_type = "car"`
`model = "BMW"`
`price = 30000`
`vehicle = Vehicle(vehicle_type, model, price)`
`print(vehicle.buy(15000, "Peter"))`
`print(vehicle.buy(35000, "George"))`
`print(vehicle)`
`vehicle.sell()`
`print(vehicle)`
	`Sorry, not enough money`
	`Successfully bought a car. Change: 5000.00`
	`BMW car is owned by: George`
	`BMW car is on sale: 30000`

9. * Movie

Create a **class Movie**. The **__init__** method should receive a **name** and a **director**. It should also have a default value of an attribute called **watched** set to **False**. There should also be a class attribute **__watched_movies** which will keep track of the number of all the watched movies. The class should have the following methods:

- **change_name(new_name: str)** - changes the name of the movie
- **change_director(new_director: str)** - changes the director of the movie
- **watch()** - change the **watched** attribute to **True** and **increase** the **total watched** movies class attribute (if the movie **is not already watched**)
- **__repr__()** - returns **"Movie name: {name}; Movie director: {director}. Total watched movies: {__watched_movies}"**

Example

Test Code	Output

`first_movie = Movie("Inception", "Christopher Nolan")`
`second_movie = Movie("The Matrix", "The Wachowskis")`
`third_movie = Movie("The Predator", "Shane Black")`
`first_movie.change_director("Me")`
`third_movie.change_name("My Movie")`
`first_movie.watch()`
`third_movie.watch()`
`first_movie.watch()`
`print(first_movie)`
`print(second_movie)`
`print(third_movie)`
	`Movie name: Inception; Movie director: Me. Total watched movies: 2`
	`Movie name: The Matrix; Movie director: The Wachowskis. Total watched movies: 2`
	`Movie name: My Movie; Movie director: Shane Black. Total watched movies: 2`