Homework Assignment Week 1

Topic: Object Oriented Programming
Date Created: December 22, 2022

Problem 1: OOP fundamentals

Give the appropriate answers for the questions below:

1. What are object-oriented design goals? Give brief explanations about them.

2. What are object-oriented design principles? Give brief explanations about them.

3. How to choose names for a class, its member functions and class-level constants?

4. What is docstring? What information does it provide?

Problem 2: Constructing a basic class

Create a Car class that includes:

1. Attributes (all of the attributes are nonpublic):

   - brand: name of the car's brand
   - model: name of the car's model
   - year: year when the car was manufactured
   - price: price of the car

2. Methods:

   - Methods to get the value of each of these attributes above, for example, `self.get_brand()`.
   - A method that friendly represents the car's information by formatting all the instance variables into an introduction message. Requirement: Use `__str__` or `__repr__` methods.
   - A method to update the car's price.

3. Create a car whose brand is Lamborghini; model is Huracan STO; price is $367.000 and was launched in 2021. Then, update the price of the car as $327.838 and print an introduction using your representation method.

Problem 3: Class Inheritance

Create a Person class that includes:

1. Attributes (all of the attributes are nonpublic):

   - name: name of the person, which only accepts input of string data type.
   - id: unique identity number of the person (validation only for positive integers)
   - age: age of the person (validation only for non negative numbers)
   - gender: biological gender of the person, which only accepts two values: 'Male' or 'Female'.

   If any of the inputs for these instance variables doesn't meet validation criteria, raise an appropriate exception.

2. Methods:

   - Methods to get the value of each of these attributes above.
   - A method that friendly represents the person's information by formatting all the instance variables into an introduction. Requirement: Use `__str__` or `__repr__` methods.

3. Create a class Student, known that a student is a person, and only student has:

   Attributes (all of the attributes are nonpublic):

   - Student ID: The student's ID at university, which only accepts input of string data type.
   - GPA: student Grade Point Average (validation: a number no less than 0 and no greater than 10), take input of GPA in 10.0 scale.

   If any of the inputs for these instance variables doesn't meet validation criteria, raise an appropriate exception.

   Methods:

   - Methods to get the value of student ID.
   - A method to convert the student's GPA from 10.0 scale to 4.0 scale and letter grade, then display GPA in these three scales. Conversion can be seen here.

Problem 4: Overloading

1. In the Student class, write a method to find a student by student ID using overloaded operation. If the input ID is matched, print out the information of the student using the representation method from the Person super class. If there is no match, print a not found message.

2. Create a list of at least 5 students and use the searching method above to find a student by his student ID.

Guidelines for submission

- Your submission must be under the `.ipynb` format.

- Your submission will be graded and it is likely that homework grade will contribute as a component in your GPA.

- If your submission is later than the due date without special consideration approval, you will receive a penalty on your mark.