CSE 460

Software Analysis and Design

(Fall 2022)

**Homework #2**

**Assigned:** August September 5, 11:59 pm

**Due:** September 16, 11:59 pm

Posting ID |\_\_|\_\_|\_\_|\_\_|-|\_\_|\_\_|\_\_|

**Note 1:** Your submission to **Gradescope** must include the above header shown in maroon color. Do not include your name in your submission.

**Note 2:** Homework is to be done individually. You may discuss the homework with your fellow students, but you are NOT allowed to copy – either in part or in whole – anyone else’s answers. You are also encouraged to meet the TA, UGTA, and instructor.

**Note 3:** All submitted materials must be legible. Text-based answers must be typed. Figures/diagrams must follow the given instructions.

**Note 4:** Please check the Canvas Discussions for further instructions, questions, answers, and hints.

**Note 5:** The format Hw#-PostingID.pdf (e.g., Hw1-1234-987.pdf) should be used for naming homework assignment files.

1. [34points] A basic loan account allows its owner to inquire about the monthly payment amount and make payments.
2. [16 points] Create a UML class for the loan account (called LoanAccount). Define the necessary attributes and methods for this class, but no more than five for each. Hint: other classes may be needed. Provide short descriptions for the attributes and methods of the LoanAccount class.
3. [18 points] Specify pre-conditions and post-conditions for two methods in the LoanAccount class. For each method, identify and write two pre-conditions and one post-condition. Hint: select methods that should have pre-conditions and post-conditions.
4. [21 points] Consider the above LoanAccount class. Note: The question is not asking to give definitions for encapsulation and modularity.
5. [7 points] Provide and explain two benefits of using encapsulation.
6. [7 points] Provide and explain one benefit of using modularity.
7. [7 points] Explain the importance of using modularity and encapsulation together.
8. [45 points] Consider developing software for a basic stopwatch that displays the passage of time. The maximum duration for time is 60 minutes and 0 seconds. The program for the stopwatch has three operations. They are for starting, pausing, and resetting the time. Suppose the stopwatch has three buttons. They are Start (stating operation), Pause (pausing operation), and Reset (reset operation). If the stopwatch is stopped, pressing the Start button causes the time to increase. If the stopwatch is progressing, pressing the “Pause” button causes the time to stop immediately. If the “Reset” button is pressed, the time is set to 0. The time is always shown on the stopwatch’s display.
9. [20 points] Create a UML class diagram for the stopwatch based on the description provided above. Limit the number of classes to no more than five.
10. [25 points] For each class, determine whether it is active or passive. For each class, explain why it is passive or active.

* Use Astah to develop UML class diagrams. Classes are not to be specified using any programming language.