2022Fall-T-CSE460-70519 Midterm Exam 2

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TOTAL POINTS

90 / 100

QUESTION 1

1 Q1 3 / 3

✓ **- 0 pts Correct**

- 1 pts The answer to the first statement is not correct. Correct answer "**True**"

- 1 pts The answer to the second statement is not correct. Correct answer "**False**"

- 1 pts The answer to the third statement is not correct. Correct answer "**True**"

QUESTION 2

2 Q2 5 / 8

- 0 pts Correct

- 1 pts Class attribute "**Multiplicity**". Correct answer "**Yes**"

✓ **- 1 pts Class attribute "**Note**". Correct answer "**Yes**"**

- 1 pts Class attribute "**Type**". Correct answer "**Yes**"

- 1 pts Class attribute "**Visibility**". Correct answer "**Yes**"

✓ **- 1 pts Java language programming attribute "**Multiplicity**". Correct answer "**Yes**"**

✓ **- 1 pts Java language programming attribute "**Note**". Correct answer "**No**"**

- 1 pts Java language programming attribute "**Type**". Correct answer "**Yes**"

- 1 pts Java language programming attribute "**Visibility**". Correct answer "**Yes**"

- 8 pts Not answered

QUESTION 3

3 Q3 4 / 4

✓ **- 0 pts Correct**

- 1 pts **Sequence Diagram** Feature **States of objects**: Answer "**No**"

- 1 pts **Communication Diagram** Feature **States of objects**: Answer "**Yes**"

- 1 pts **Sequence Diagram** Feature **Time ordering of interactions**: Answer "**Yes**"

- 1 pts **Communication Diagram** Feature **Time ordering of interactions**: Answer "**Yes**"

QUESTION 4

Q4 6 pts

4.1 a 3 / 3

✓ **- 0 pts Correct**

- 1.5 pts Identified **logical** correctly. The Object diagram is **static**.

- 3 pts The UML object diagram falls into the **structural** category. The category is the same as **Logical and Static**.

- 0 pts Click here to replace this description.

4.2 b 1 / 3

- 0 pts Correct

✓ **- 2 pts UML diagram identified that is most closely related to the object diagram is not correct**

- 1 pts The** UML use-case diagram** identified to be most closely related to the object diagram is mostly meaningful

QUESTION 5

5 Q5 6 / 6

✓ **- 0 pts Correct**

- 2 pts "**one**" in the partial sequence diagram represents "**an object**"

- 2 pts "**XYZ**" in the partial sequence diagram represents "**a class**"

- 2 pts The relationship provided between one and

XYZ is **incorrect**. The correct relationship "**one is an instance of the class XYZ**"

- 1 pts The relationship between one and XYZ provided is partially correct

QUESTION 6

6 Q6 **9 / 10**

- 0 pts Correct

- 3 pts The generalization set is missing

✓ **- 1 pts** **It is expected to provide two valid **constraints** with the relationship between classes**

- 0.5 pts One valid **constraint** for the relationships between classes is provided.

- 1 pts **PassengerCar** generalizes the **LicencedDriver** class

- 1 pts **CommercialTruck** generalizes the **LicencedDriver** class

- 1.5 pts The relationship provided between **PassengerCar** and **CommercialTruck** is not meaningful as per problem statement

- 5.3 pts Constraints provided are mostly meaningful with the problem statement.

- 1 pts Incorrect visual syntax is used

QUESTION 7

7 Q7 **8 / 8**

✓ **- 0 pts Correct**

- 2 pts Incorrect relationship identified between "**R**" and "**AB**"

- 2 pts Incorrect relationship identified between "**AB**" and "**QZ**"

- 2 pts Incorrect relationship identified between "**R**" and "**QZ**"

- 8 pts Not answered

- 1 pts Visual syntaxes used for relationships are incorrect

- 5 pts No visual lines drawn to depict the relationships among classes and interface.

QUESTION 8

Q8 15 pts

8.1 a **3 / 3**

✓ **- 0 pts Correct**

- 3 pts Correct answer is "**Yes**"

8.2 b **3 / 3**

✓ **- 0 pts Correct**

- 1.5 pts Explanation is not meaningful with the problem statement

- 0.5 pts Explanation is mostly meaningful with the problem statement

8.3 c **3 / 3**

✓ **- 0 pts Correct**

- 1.5 pts Identified states are not meaningful with the problem statement

- 0.5 pts Identified states are mostly meaningful with the problem statement

- 3 pts Not answered

8.4 d **6 / 6**

✓ **- 0 pts Correct**

- 3 pts Identified transitions are not meaningful with the problem statement

- 1 pts One transition is missing

- 2 pts two transitions are missing

- 3 pts Three transitions are missing

- 4 pts Four transitions are missing

- 5 pts Five transitions are missing

- 6 pts Six transitions are missing

- 5 pts Answer is incorrect

- 0 pts There are few missing transitions such as self-transitions

- 6 pts Not answered

QUESTION 9

Q9 16 pts

9.1 a **3 / 4**

- 0 pts Correct

- 2 pts It is expected to provide a **classification approach** for the volume of the tube.

✓ **- 1 pts** **The identified classification approach is**

mostly meaningful with the problem statement.

- 2 pts it is expected to provide the values for the variable tube volume.

- 1 pts The identified values are mostly meaningful with the problem statement and the** classification approach** mentioned.

9.2 b **10 / 12**

- 0 pts Correct

- 7 pts UML class is expected as per problem statement.

- 2 pts The attribute to hold the value for tube volume is expected.

✓ **- 0.5 pts Detailed specification (such as range of values and definition) for **attributes** mentioned in UML class Base Tab is not provided.**

✓ **- 0.5 pts It was expected to provide at least one** advanced detailed specification for attributes such as {tag value} ** that is meaningful.**

- 0.5 pts The types and visibilities provided for the attributes are mostly meaningful.

- 2 pts A method to get the tube volume is expected.

✓ **- 1 pts Detailed specification (such as definition) for **methods** mentioned in UML class is not provided**

- 1 pts The arguments, visibility or return type provided for the methods are mostly meaningful.

- 12 pts Not answered

QUESTION 10

10 Q10 **23 / 24**

- 0 pts Correct

- 15 pts It is expected to complete the UML use-case diagram

- 4 pts At least one actor (not EV) was expected to be included

- 1 pts Actor name is not provided

- 2 pts The description for one actor is not provided

- 6 pts use case 1 is not provided

- 1 pts The **use case 1 **provided is mostly meaningful to the problem statement

- 1 pts use case 1 name is not provided

- 2 pts The description for use case 1 is not provided

- 6 pts use case 2 is not provided

- 1 pts The **use case 2** provided is mostly meaningful to the problem statement

- 1 pts use case 2 name is not provided

- 2 pts The description for use case 2 is not provided

- 3 pts At least one **include** relationship was expected

- 3 pts At least one **extend** relationship was expected

- 1 pts Use case should have association with at least one actor

- 1 pts The relationships provided are mostly meaningful to the problem statement

- 2 pts There is the discrepancies in the use case diagram and the use cases and actors definition provided

- 1 pts The **include** relationship provided is mostly meaningful to the problem statement

- 1 pts The **extend** relationship provided is mostly meaningful to the problem statement

✓ **- 0.5 pts The direction of **include** relationship is not correct**

✓ **- 0.5 pts The direction of **extend** relationship is not correct**

(13)

CSE-460 (Soft. Anal. & Des.) **Posting ID:** 9 9 5 7 2 6 6

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Midterm Exam 2: Monday Nov. 07, 2022

Individual Work

Format

- Closed books and notes
- Digital media, internet access, or communication of any kind is **NOT** allowed

- Can have two two-sided, 8.5" × 11" crib sheet
- Crib sheet must be your own & include your Posting ID at top right corners
- The crib sheet must be turned in with the exam

Partial points will **NOT** be given to True/False and Fill-in-the-blank questions

Exam Coverage

All materials (including textbook chapters, course notes, homework assignments, and review sessions) covered in the course prior to this midterm exam

Emphasis will be on the materials covered since Midterm exam 1

Tempe Locations: CDN 60 and CAVC 359
Polytech Location: PRLTA 122

Classroom assignments for Tempe will be announced by 8 AM, Nov. 07, 2022

You MUST HAVE your ASU ID card to take the exam; NO other ID card is acceptable

Please arrive a few minutes early

Read questions carefully and answer what is asked for. Answer all questions.

As necessary, make appropriate assumptions & include them in your answers.

Total points: 100

NOTES:

- All specifications are to be developed according to the UML standards (Astah)
- Use the Java Programming Language as needed

*** Any answer written on the last page will not be graded ***
*** Answers to questions should be written in their provided spaces ***

1. [3 points] For each of the rows in the table below, determine whether the statement is True or False according to the UML class diagram language. Mark your answers with **X**.

	True	False
A class can be an abstract and root	X	
A class can be abstract and leaf		X
A concrete class can be instance scoped	X	

2. [8 points] UML classes can have varying levels of abstraction in terms of their attributes. Complete the table below. Mark your answers with **X**.

	Class Attribute		***Java programming language***	
	Yes	***No***	***Yes***	***No***
Multiplicity	X			X
Note		X	X	
Type	X		X	
Visibility	X		X	

3. [4 points] The UML sequence and communication diagrams may be used for specifying the behavior of a software system. For each of the Sequence and Communication diagrams, it may or may not allow specifying the features in the table shown below. For each row, write **Yes** or **No** for the Sequence Diagram and Communication diagram columns.

Feature	**Sequence Diagram**	**Communication Diagram**
States of objects	No	Yes
Time ordering of interactions	Yes	Yes

4. [6 points] Consider the general categories that all UML diagrams are divided into.

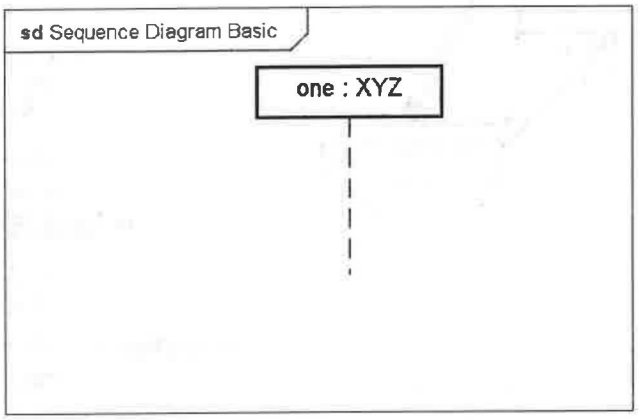
   (a) [3 points] Name the category in which the UML object diagram belongs to:

   Structural categorization

   (b) [3 points] Identify a UML diagram that is most closely (directly) related to the Object diagram. The identified diagram cannot be in the category the Object diagram belongs to:

   UML Class Diagram

5. [6 points] Consider the **one : XYZ** element in the partial sequence diagram shown below.



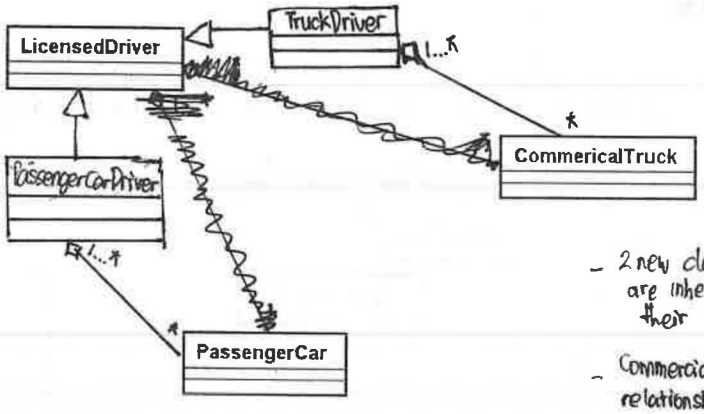
Identify what things the **one** and **XYZ** represent in the above partial sequence diagram.

one: object instance

XYZ: Class name

Relationship between **one** and **XYZ**: Object instance of the Class

6. [10 points] Suppose different kinds of drivers work at a company. Some employee need driver's licenses to operate passenger cars. Others need driver's licenses to operate commercial trucks. Other kinds of driver's licenses may be required, for example, to operate buses. Complete the class diagram with suitable relationships and constraints. No need to add classifiers.

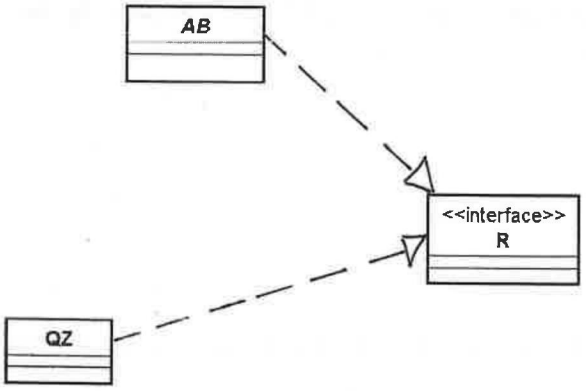


- 2 new classes Truck driver and Passengercardriver are inherited from licensedDriver and are drivers for their corresponding vehicles
- Commercial Truck and PassengerCar has an aggregation relationship with their corresponding driver because they need an appropriate driver, but can still exist without one
- A driver can be assigned any number of commercial truck and passenger car

Assumptions :
- Commercial Truck and passenger car can be driven by multiple drivers (atleast 1)
- A commercial truck and licensed driver exists with a commercial driver

7. [8 points] Specify a set of relationships among the above classifiers shown in the class diagram below. Hint: details such as attributes and methods are not needed to answer this question.

Assumptions :
- Interface R provides functionsnames for drivers which can be shared among both passenger car and truck drivers



- AB and QZ are instances of passenger car and truck drivers which are both licensed drivers and can implement interface R

8. [15 points] Consider a UML class called Seller that has an attribute `privilege` with possible settings low, medium, and high. There is a method called `changePrivilege(...)`. It can change the `privilege`, for example, from low to high.

   (a) [3 points] Is there any advantage of specifying public visibility for `changePrivilege(...)` instead of specifying public visibility for the `privilege` attribute? Mark your answer with **X**.

   Yes X ; No _____;

   (b) [3 points] Explain your answer to part (a).

   Specifying public visibility for changePrivilege is a form of a setter method. A setter method is beneficial as it promotes encapsulation and prevents other classes from unintentionally modifying the attribute privilege.
   e.g. One Seller can low another seller's priority (is not favourable)

   (c) [3 points] Identify all possible source and target states that may be used for specifying a state machine for the seller class.

Source	Target
Low Privilege	Low Privilege
Medium Privilege	Medium Privilege
High Privilege	High Privilege

   (d) [6 points] How many transitions are possible for the `low`, `medium`, and `high` states of the seller class? Hint: it is not necessary to specify details for the state transitions.

   6 transitions

   low → medium
   low → high
   medium → low
   medium → high
   high → low
   high → medium

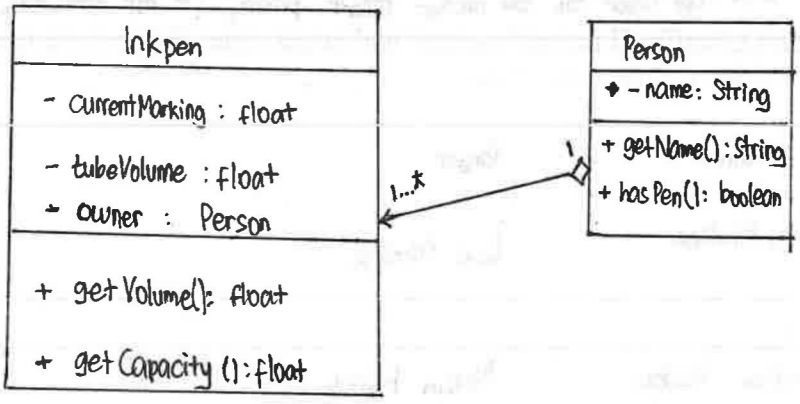
9. [16 points] Consider ink pens that have tubes. A pen's tube has markings ranging from 0.0 (empty) to 10.0 (full) milliliters. The volume can be within any two consecutive markings, for example, 1.3 milliliters.

   (a) [4 points] Identify an approach that is most suitable for classifying the variable for the tube volume. Provide values for the variable.

   Structural Categorization

   - Tube Volume has a specific marking range, all ink pens will have this same range
   - The variable should identify the end of the current ink level
   - Values will range between 0.0 and 10.0 millilitres

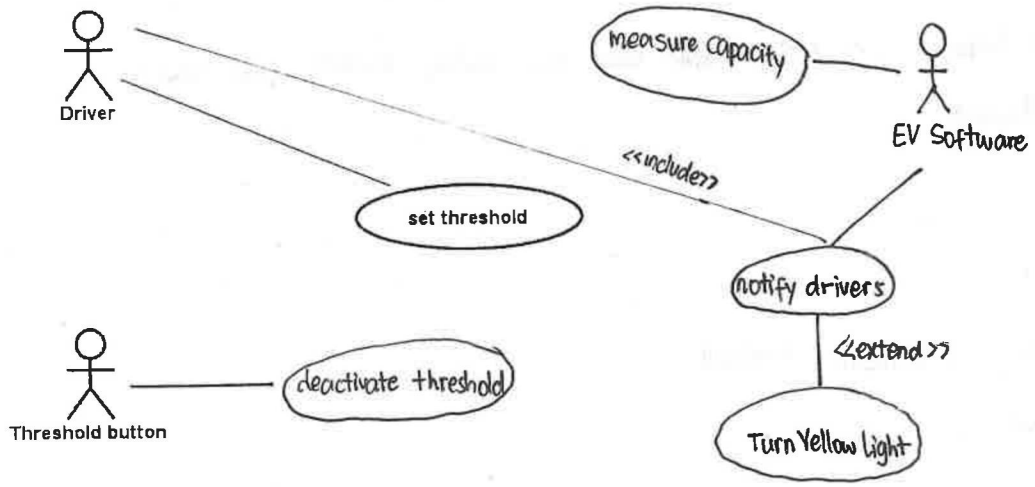
   (b) [12 points] Design a UML class for these pens. This class should specify a pen's tube volume and find its value. The class should have detailed specifications for its attributes and methods. Specification for one of the attributes should have one advanced property in addition to name, visibility, and type.



10. [24 points] A customer is interested in software that informs an Electric Vehicle (EV) driver about the car's battery capacity falling below a threshold. When the battery capacity reaches zero, the car cannot be driven.

- The software periodically measures the capacity of the EV's battery (say every 1 minute).
- The software should notify the driver when its capacity falls below a default threshold. The threshold value is the minimum number of miles the vehicle can travel, given the battery's remaining capacity. The driver can optionally change the battery's capacity threshold.
- The software turns on a yellow LED light when the battery capacity falls below the threshold.
- A driver can change the threshold after a threshold button is activated. When the button is deactivated, the default threshold is restored.

Complete the partial use-case diagram below. Add at least one actor, at least two use-cases, one include relationship, and one extend relationship. Specifications for the relationships should be drawn in the use-case diagram. You may add more actors and use-cases, but do not need to provide descriptions for them. Hint: EV is not an actor.



Provided Actor and Use-case

Driver: A person who can drive an Electric Vehicle.
Threshold button: A button that a driver can activate for changing the battery capacity threshold.
set threshold: Drivers can set the threshold value.

Actor name: EV Software

Actor definition:

The electric vehicle software that informs drivers about the car's battery capacity falling below a threshold

Use-case name: Notify Drivers

Use-case definition:

EV Software can notify driver when the battery capacity falls below a threshold

Use-case name: deactivate threshold

Use-case definition:

Drivers can deactivate threshold button and restore the default threshold.