UNI:

Computer Science COMS W4156 Advanced Software Engineering Fall 2017 - Midterm Exam

Makeup

Do not open the exam until the proctor tells you to do so. You may not use any books or notes. You may not use a calculator or any other device beyond a pen, pencil and eraser. Please write each answer in the corresponding space, continuing on the blank backs of pages if needed. Read through the entire exam before beginning to answer questions. Question 3 is long, with some intermediate pages to provide plenty of space for answers. **It is not necessary to use all the space.** The exam consists of 13 pages, with the last page saying only "(this page intentionally left blank)".

Name:

UNI (also put your UNI at the top of every page, since the pages will be separated during grading):

Problem No.	**Max Points**	**Points Scored**
1	10	
2	15	
3	35	
Total	60	

Problem 1 – Multiple Choice
(10 minutes, 10 questions, 1 point for each correct answer)

Circle the letter that represents the **best** answer to each of the following questions.

1. What is a *design sprint*?
    a. The first iteration, when the team develops the design for the entire project
    b. A brainstorming meeting with customers
    c. A short process for working through potential solutions for a specific problem
    d. All of the above
    e. None of the above

2. Which of the following should be specified in **every** user story?
    a. The user role the story applies to
    b. Why the user wants this feature
    c. The application's behavior
    d. All of the above
    e. None of the above

3. What does **MVC** stand for?
    a. Meaningful Value for Customers
    b. Motor Vehicle Commission
    c. Model, View, Controller
    d. All of the above
    e. None of the above

4. Which **best** corresponds to the Single Responsibility Principle (SRP)?
    a. Comments that explain "what" rather than "why"
    b. Cohesion
    c. Coupling
    d. All of the above
    e. None of the above

5. Which **best** characterizes an application framework?
    a. A structured set of libraries that support the common functionalities of applications in a particular domain
    b. Common gateway interface (CGI)
    c. Secure programming techniques
    d. All of the above
    e. None of the above

6. What would an **agile** team do when there are only two days left in the current iteration, but the team has six more days of user stories planned for this iteration?
    a. Move at least four days of user stories to the "Overflow" section of the Task Board
    b. Extend the length of the iteration by four days
    c. Require all developers to work over the weekend
    d. All of the above
    e. None of the above

7. Which of the following are **common** techniques for requirements elicitation?
    a. Roleplaying
    b. Observation
    c. Brainstorming
    d. All of the above
    e. None of the above

8. Who **should** determine the Time Estimates for User Stories?
    a. Developers
    b. Customers
    c. Government Regulators
    d. All of the above
    e. None of the above

9. Which of the following **might** be true for an Association in a Class Diagram?
    a. The multiplicity of child components is specified
    b. The generalization/specialization hierarchy is specified
    c. The choice of database system is specified
    d. All of the above
    e. None of the above

10. Which of the following **might** be found by a Static Analyzer?
    a. Code smells
    b. Resource leaks
    c. Deviations from coding conventions
    d. All of the above
    e. None of the above

Problem 2 – Vocabulary
(15 minutes, 5 questions, 3 points for each correct answer)

Explain the following with prose and/or drawings.

a. Planning Poker

b. Tagging (in a version control system)

c. Conditions of Satisfaction

d. Waterfall process

e. Testing the Specification

Problem 3 – Mini-Project
(35 minutes, 35 points maximum, 3 questions)

Imagine that you are developing an implementation of a "Metrocard Vending Machine", or MVM. MVMs are provided in the New York City subways to dispense cards to passengers that the passengers then use to pay for subway rides. The primary features that the machine needs to provide are:

1. The MVM accepts only cash payments.
2. The MVM can make change (e.g., if the passenger provides a $10 bill to pay for an $8 credit, the machine returns $2 in coins).
3. The MVM contains an infinite supply of subway cards and coins (i.e., it never runs out of cards and can always supply change) and has an infinitely large box in which to store cash (i.e., it can always accept a passenger's payment).

A separate machine accepts a subway card, deducts the cost of the ride from the variable balance, and returns the card to the passenger. It does something appropriate if the balance remaining on the subway card is less than the cost of the ride. This separate machine was already developed by another contractor and cannot be changed.

The actual questions to answer are on the following pages, parts A, B and C.

Part A – Requirements (10 minutes, 10 points)

This specification of the project is incomplete. In particular, it does not say much about subway cards, or how the user (passenger) and the MVM interact with respect to subway cards, it only gives some information about how a separate machine operates with subway cards. Write a set of 3-5 user stories that together specify the *baseline* (highest priority) functionality of the MVM with regards to subway cards, **not** including CRUD operations (or synonyms for CRUD operations). Do not be concerned with the MVM's UI. There is no single correct answer.

Continue your answer for part A on this page if necessary (you can also use the backs of pages).

Part B – Design (15 minutes, 15 points)

Draw a set of class diagrams to implement at least three of your new user stories for subway cards (part A). Omit CRUD operations. *Explain* your diagrams in prose. Most importantly, discuss *why* you chose this design. Describe any assumptions you made about the design of the other functionality specified as part of the problem setup. Do not be concerned with the MVM's UI. There is no single correct answer.

Continue your answer for part B on this page if necessary (you can also use the backs of pages).

Part C – Project Planning (10 minutes, 10 points)

The requirements described in the project setup (except for subway cards) have all been completed as part of one or more previous iterations, and have already been demo'd to the customer (some agency associated with New York City). Describe how you would plan your next iteration, and additional later iterations if necessary, so that your team (of four members) can demonstrate the new user stories for subway cards to your customer. Now you **do** need to be concerned with the MVM's UI, since you want to show the system to the customer. It will also take your team some period of time to complete the user stories and prepare the demo. Make sure to explain **how** you would plan, i.e., what your team needs to do during the project planning process. There is no single correct answer.

Continue your answer for part C on this page if necessary (you can also use the backs of pages).

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