CS 347 Software Development Process: Midterm Exam

Your name: _____
Your name: _____
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Your name: _____

Please sign your name on the line below to accept the pledge:
I pledge my honor that I have abided by the Stevens Honor Code.

_____

Your score: _____ out of 52

Question 1. *(10 pts.)*
For each of the stages of software development that are fundamental and present in all software development processes, give the stage's name and briefly explain what activity takes place in that stage.

Question 2. *(4 pts.)*
There are many "agile" software development processes. State and explain at least two ways in which all agile software development processes differ from older, plan-oriented processes such as the Waterfall process.

Question 3. *(4 pts.)*
For each of the circumstances listed below, indicate whether the circumstance favors the use of an agile software development process or a traditional plan-oriented software development process.

- System has a long expected lifetime
- Development team is small and in one place
- System is subject to strict laws/regulations
- Requirements are uncertain and subject to change

The following describes a hypothetical software development effort. Use information here to answer questions 4-7 on the following pages.

Bendomino's chain of pizza delivery stores is developing software for online ordering. Customers can order either from a smartphone app or from a web page. To order a pizza for delivery, the customer enters his/her street address, a credit card number, size/topping selections, and either an email address or telephone number.

Once received, the order is displayed on touch screens mounted inside the kitchen at the nearest Bendomino's outlet; kitchen staff look at the screens to see what food to prepare. At each of several key preparation points, kitchen staff or drivers use the touch screens to enter indications that the order has reached each point. The key points are: order started, food into oven, order assembled for delivery, order given to delivery driver, and order delivered to customer.

At each point, the customer is notified. If the customer entered an email address, notification is via email. If the customer entered a phone number, notification is via text message. Also–if the customer left the app or web page open after ordering–a little Bendomino's icon with a big mustache and a tall chef's hat notifies the customer, in an Italian accent, when each key point is reached.

Each driver has a tablet that lists the orders that he/she should be delivering, in what order, on his/her current trip. The tablet also shows the driver which in-progress orders he/she will pick up next once he/she returns to the store.

The store manager can use the system to lookup such information as average prep time, average drive time, number of orders processed per hour, etc.

Headquarters staff can use the system to lookup the same information that each store manager sees. They can also see which sizes/toppings are most popular, how many customers use the app versus the web versus calling a store versus walk-in ordering, average revenue per order, which stores get the most orders, etc.

Question 4. *(9 pts.)*
This development effort has many use cases.

4a. Draw a UML Use Case diagram that includes at least 3 Actors and links each actor to at least one use case; Actors can be linked to the same use case if that is appropriate. Be sure to label the Actors appropriately and write succinct but clear use case descriptions.

4b. Indicate the priority of the use cases in your drawing. In what order should they be developed, and why?

Question 5. *(8 pts.)*
Write at least two "user stories" for this development effort. Each should include the essential information for a user story. Use a high/medium/low priority scale. Use a 1/2/3 size estimate point system, with 3 meaning the biggest effort. Briefly state why you chose high/medium/low and 1/2/3 for each user story.

Question 6. *(9 pts.)*
Focus on a single technical aspect of the pizza ordering system, and write two test case scenarios for that feature.

Question 7. *(8 pts.)*
Bendomino's offers 4 sizes of pizza and 15 toppings so there are many ways ($4 \times 2^{15} = 131,072$) to prepare a pizza. Each pizza must be represented accurately (with correct size and toppings) within the ordering system. Defining 131,072 classes is clearly out of the question, and using instance variables to describe so many options is unwieldy.

7a. Give the name of the design pattern that would be most appropriate to address this situation.

7b. Draw a UML Class diagram that shows appropriate classes/interfaces and how the design pattern would connect them. When the drawing would include many boxes for similar classes – e.g., 4 classes, one for each size – you can draw only one box and label it "4 classes, one for each size."