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**Software Engineering I (CS 561)**

**Final Exam**

**Part I (20 points)**

Circle either true or false to indicate that the following statements are true or false. Evaluate “truth” in terms of the material covered in this course. The statements below are intended to have an unambiguous answer.

1. T F A modal dialog must be closed or dismissed before interacting with another part of a user interface.

2. T F Software cohesion refers to how well parts of a module belong together.

3. T F Composition is a strong form of aggregation in which objects that are part of the composition are destroyed when the aggregate is destroyed.

4. T F All good software has high coupling between modules.

5. T F Activation boxes represent the flow of time in a sequence diagram.

6. T F The Read-Only Interface design pattern utilizes methods from pre-existing classes within new classes.

7. T F A framework is reusable software with a generic solution to a generalized problem.

8. T F Usability guidelines for user interfaces include using consistent fonts, colors, and font size throughout a user interface.

9. T F Central use cases are use cases that a project may be built around.

10. T F UML state diagrams may include states with descriptions of actions or activities.

**Part II (80 points).**

Read instructions and questions carefully.

1. When designing a software product, it is important to get to know the users and their needs. What are two important characteristics to learn about users? Explain how are those characteristics are related to usability (5 points).
2. List five principles of usability. Hint: many of these should be obvious after you complete problems 3 through 8 (10 points).
3. Assume you are working on a patient information system from a hospital. Draw class diagrams for the Patient, graphical user interface (GUI), User, Administrator, and a HospitalDataSystem. Note that there is data common to the User, Administrator, and Patient such as a name and ssn. Patients may have symptoms, insurance information, etc. Users and Administrators have user ids and different permissions. The hospital administration system includes a list of patients, and must include functionality to add patients, delete patients, etc. (12 points).
4. Provide two use cases for the patient information system in problem 3. Your use cases must include at least 5 steps each, and you must identify actors and system responses. Any actions taken using operations on an object within the patient information system must be shown in the class diagram from problem 3 (10 points).
5. Draw an activity diagram (remember, this is similar to a flowchart) for actions that occur while creating a Patient object in problem 3. Verification of valid insurance and downloading existing patient records from an external server occur concurrently. If pre-existing patient records are on an external server, they must be added to the patient’s local records. If insurance verification fails, a modal dialog must be displayed. Once all concurrent actions are complete, a dialog indicating that a record has been created must be displayed (10 points).
6. Draw a sequence diagram for a user’s GUI interaction to create a Patient in problem 3. Be sure to include methods that allow the user to create a patient object, to add patient data to the object, to store the object in the hospital’s data system, to display appropriate feedback, and to obtain patient data from an external server. Remember, sequence diagrams show a progression of time using activation boxes (10 points).
7. Create a paper prototype for the patient data entry portion of problem 3. Be sure to include the patient’s name, date of birth, gender, insurance information, symptoms, allergies, current medications, etc. Additionally, include submission and cancel buttons. Identify the names of at least four of the UI objects you have used in your paper prototype. List any deficiencies in your prototype after you have drawn it (10 points).
8. Draw a state diagram for transitioning a manual transmission car between first, second, third, fourth, reverse, and neutral gears. Direct gear transitions must be made in order, except that transitions to and from neutral may be made from any state, and the car must be started in neutral. Transition to and from reverse may only be made from neutral (5 points).
9. You are given the following four metrics: number of classes within a project, number of methods per class, number of public instance variables per class, and number of parameters per method. What type of coupling corresponds to each of the given metrics? Justify your answers (8 points).