True or False (.5 each)

_____ 1. Domain models describe static relationships between major application concepts.

_____ 2. Domain modeling can be used to help find classes that will give a system a more stable basis, which will make it more able to accommodate changes to its functionality.

_____ 3. In a layered tiered design, an upper layer can send messages to a lower level, but not vice versa. Call backs are the exception to this.

_____ 4. Domain models, unlike design class diagrams, do not have method names and signatures.
Process Stages

1. Name the phases that might be in a typical 5 phase waterfall process model. (1.5)

Requirements

1. Give the names for the different kinds of requirements, as denoted by the FURPS acronym. (.5 each)

F
U
R
P
S

Observer/observable

These are Java classes which can be used to design/implement callbacks. They form a kind of design pattern.

The Observable class can be extended by a subclass, in order to acquire its capabilities. Which of the following is correct (check one or more). i.e. which is provided by the Observable abstract class? (1 pt)

___ a) a container of some kind which maintains a reference to all the registered objects that want to be informed when a certain event occurs
___ b) a method for each registered object which is to be called when the event of interest occurs
___ c) a method which is used for registering an object that wants to be informed when an event of interest occurs
___ d) a method for causing all the registered objects to be informed, in accordance with the strategy used in the underlying pattern
Sequence Interaction Diagrams

1. Match the following (in reference to sequence interaction diagrams) (one answer per slot, no answer used twice) (.5 each)

_____ Used to show an "internal" action taken by an object

_____ Messages that indicate a return value or data

_____ One of the 3 standard special classes of objects in a diagram, when the Rational approach is used

a. classes  
b. line with no arrow  
c. self-message  
d. control/controller  
e. dotted line with arrow

2. Client Server and Sequence interaction diagrams

In class we provided a general approach for deriving a state diagram from a set of sequence diagrams for a client-server distributed system. Choose one answer for the following.

_____ What corresponds to a state in a sequence interaction diagram (.5 pt)

a. Domain model  
b. State diagram  
c. Places in the lifeline for an object just after a message is received  
d. Places in the lifeline for an object where a message has just been sent.

3. Sequence diagram interpretation

Consider the following diagram and determine which of the following is true or false for the scenario it depicts. (.5 each)

_____ Just after its first interaction (message plus reply) with :DSServer, :DSClient does a displayLogOn() screen again because :DSServer has returned a NIL value to a message.

_____ Immediately after the second interaction between DSClient and DSServer, the diagram implies that a non-NIL, Member message has been returned, and the :DSClient does a displayDaterPreferences()
The User/Actor to :DSClient messages correspond to some form of input, probably through a GUI, in an input form managed by the :DSClient object.
Collaboration Diagrams

1. Consider the following diagram. Why have we labeled the messages 1a, 1b, and 2, instead of just 1, 2, and 3? (1 point)

2. Consider the following collaboration diagram.

1: userName = name

create(name)→

: LogOn
When this gets translated into actual code, there will be some LogOn class method that will contain the action labeled 1. What will it be? (1 point)

3. Collaboration diagrams and GUI design.
A collaboration diagram for an object x shows how x responds to an event. This is commonly associated with receiving a message. x may then perform some actions itself, and/or send messages to other objects. Other diagrams show how those objects respond to the messages sent to them by x.

When we use a collaboration diagram to model a GUI, instead of a message from another object, GUI objects will often be described as responding to some other general kind of event(s). What are these? (1 point)

**Design Evaluation and Elementary Patterns**

1. **Class cohesion (.5 each)**
   For each of the following, indicate if it has low or high class cohesion

   _____ Class is responsible for many things in very different functional areas

   _____ Class has moderate responsibilities in one functional area and cooperates with others to fulfill more complex responsibilities

   _____ Class is responsible for a few very complex things in one functional area
2. General kinds of cohesion
List the 7 levels of general cohesion, giving a one sentence explanation of each. (.5 each)

3. Class Coupling (.5 each)
List 4 kinds of class coupling.
4. Design patterns

Patterns provide guidelines for responsibility allocation. Match the following (Use each answer at most once, and give only one answer per question) (.5 each)

_____ Assign the responsibility to the class that has the information necessary to fulfill those responsibilities.

_____ Take things that you would normally do to an object and have it do itself.

_____ Assign this responsibility to the object that has the data necessary to initialize an object

a. Object animation
b. Creator pattern
c. Controller pattern
d. Expert pattern
e. The Bridgette pattern

6. Which basic controller pattern did we use in the sample Dating System program used in class? Give a brief description of where it occurs in our design, and how it functions as a controller. (1 pt)

Functional and O/O Design Descriptions and Derivation

1. Programming by (stepwise) refinement. Which of the following is true of this strategy for functional/procedural design? (Check those that apply) (.5 each)

_____ Top down, in which abstractions are replaced by concrete code

_____ Prose contained inside an actual code framework, mixed with actual code (i.e. uses pseudo-code)
2. Object Visibility in Object Oriented Designs

Fill in the blanks with a selection from the choices below. (One answer per blank, and each answer used at most once.) (.5 each)

In the collaboration model for the :GUIFrame object in the DS example, the following occurs.

:GUIFrame gets a Start/End message. If it is Start, it sends a show() message to the LogOnDialog instance. It is able to do this because this dialog is created at start up time, and is assigned to be the value of a GUIFrame class variable. This is an example of _________. After this, :GUIFrame sends a getUserType() message to dL:DomainLogic. It is able to do this because dL is passed as an argument to the constructor for :GUIFrame, which it preserves. Its initial visibility to this object, via the constructor is an example of ________ visibility.

a. parameter visibility
b. local variable visibility
c. attribute visibility
d. corrected visibility
e. global visibility

Object Oriented Programming

1. Abstract data types

____ Are both of the following valid ways of viewing the relationship between abstract data types and classes? (T/F) (1 pt)

i) Abstract data type is a specification and a class is an implementation

iii) Abstract data type is for simple algebraic objects and classes for more complex structures

2. Testing

Match the following (use each answer exactly once) (.5 each)

____ May be needed if you first test all the classes/methods that do not call other classes but which may be called by other classes/methods

____ May be needed if you first test all the classes/methods that are not used by other methods, but which may use other methods/classes
a) Stubs
b) Drivers

3. What is a simple way of making a class "self testing". (1 pt)

4. JUnit
When you create a subclass of JUnit, it can be used to create instances of test cases if it contains certain kinds of methods that will be run by the JUnit TestRunner. How does JUnit recognize these test methods? (1 pt)