Final Exam CISC 475/675 Fall 2004

True or False [2 pts each]:

1. (True/**False**) All software development processes contain at least separate planning, testing, and documentation phases.

2. (**True**/False) The main idea of the spiral life-cycle model was the introduction of risk management/mitigation as a primary organizing concept.

3. (True/**False**) In the Unified Process, each phase should have exactly 4 iterations.

4. (True/**False**) In the Unified Process, the four phases are Requirements, Analysis, Deisgn, and Implementation.

5. (**True**/False) Because the Chief Programmer Team approach is generally impractical, most organizational managers suggest replacing the chief programmer with both a team leader in charge of technical aspects and a nontechnical team manager.

6. (True/**False**) In Walkthroughs (as opposed to Inspections), the team is charged with documenting and correcting any faults found.

7. (**True**/False) A module has Procedural Cohesion if it performs a series of operations related by the sequence of steps to be followed by the product.

8. (True/**False: what the client NEEDS!**) The primary focus of the Requirements workflow/discipline is determining what the *client* wants.

9. (True/**False**) The primary output of the Requirements workflow/discipline are use case diagrams.

10. (**True**/False) The noun-extraction method is one technique used in the Analysis workflow/discipline.

11. (**True**/False) In general, Collaboration and Sequence diagrams can be used interchangeably.

12. (**True**/False) Responsibility-driven design is used to solve the method-assignment problem.

13. (True/**False: GLASS-BOX!**) Statement, Branch, and Path Coverage are common black-box testing techniques.

Short answer:

14. [2 pts] The main difference between a domain model and a design model is:

    Class method assignments

15. [2 pts] Name one thing that is better about top-down integration and one thing better about bottom-up integration.

    Top Down: Fault isolation, stubs not wasted, major design flaws show up early

    Bottom Up: operational artifacts are thoroughly tested, no fault shielding from above, fault isolation

16. NOT COVERED in 2005 [3 pts] Consider a software system to control an "intelligent" home. What are the most likely UML stereotypes for the following classes [chosen from the set *entity class*, *boundary class*, *control class*]?
    a. HotWaterHeater Class **Entity**
    b. SecurityProcess Class **Control**
    c. FiveDayWeatherForcast Class **Boundary**

17. [3 pts] List three important components of a use case.

    CHARACTERISTIC INFORMATION
Goal in Context: <a longer statement of the goal, if needed>
Scope: <what system is being considered black-box under design>
Level: <one of: Summary, Primary task, Subfunction>
Preconditions: <what we expect is already the state of the world>
Success End Condition: <the state of the world upon successful completion>
Failed End Condition: <the state of the world if goal abandoned>
Primary Actor: <a role name for the primary actor, or description>
Trigger: <the action upon the system that starts the use case, may be time event>

MAIN SUCCESS SCENARIO

EXTENSIONS

SUB-VARIATIONS
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18. [2 pts] What is the difference between coupling and cohesion?
coupling BETWEEN modules, cohesion WITHIN.
desire LOW coupling, and HIGH cohesion.

19. [2 pts] Give one argument FOR and one argument AGAINST formal correctness proofs for software. NOT COVERED in 2005

FOR: guarentee some properties; safety critical
Against: can't know that spec is correct; can't do the code proof automatically

20. [3 pts] Name three unique characteristics of XP (eXtreme Programming) teams.

Pair programming
Continuous integration of tasks
The computers are put in the center of a large room lined with cubicles
A client representative is always present
Software professionals cannot work overtime for 2 successive weeks
No specialization
Refactoring (design modification)

21. [2 pts] Briefly describe the difference between CMM-2 and CMM-5.

CMM2 is just starting to apply any process while CMM5 has meta-process in place to learn, adapt, and improve its processes that are already consistently applied, measured and managed.

22. [2 pts] What is the main difference between waterfall lifecycle models and intererate-and-increment lifecycle models?

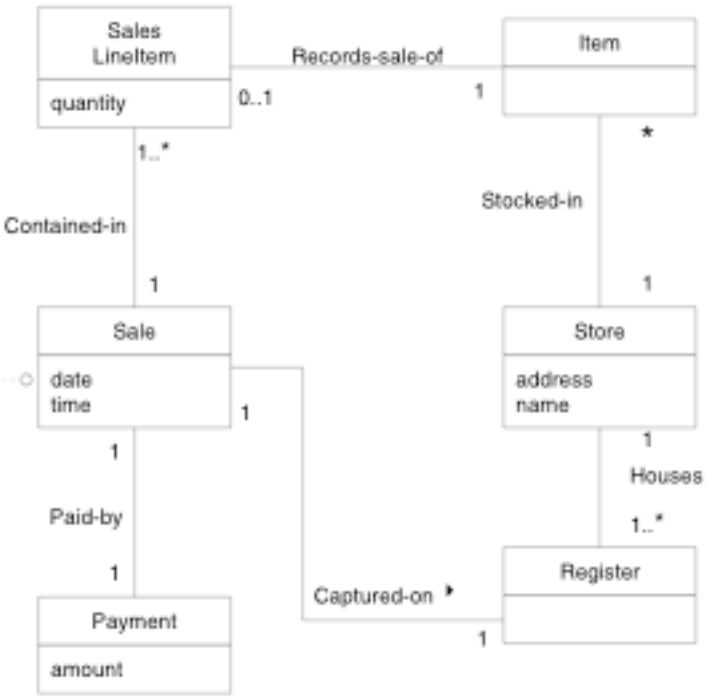
iteration!

23. [2 pts] Briefly explain the cost of fixing a fault vs. the time at which it is detected.

Fixing is MUCH more expensive as time goes by.

[10 pts] Draw a simple domain model for the following use case involving a POS (Point Of Sale) terminal:

Main Success Scenario (or Basic Flow): 1. Customer arrives at a POS checkout with goods and/or services to purchase. 2. Cashier starts a new sale. 3. Cashier enters item identifier. 4. System records sale line item and presents item description, price, and running total. Price calculated from a set of price rules. Cashier repeats steps 2-3 until indicates done. 5. System presents total with taxes calculated. 6. Cashier tells Customer the total, and asks for payment. 7. Customer pays and System handles payment. 8. System logs the completed sale and sends sale and payment information to the external Accounting (for accounting and commissions) and Inventory systems (to update inventory). 9. System presents receipt. 10.Customer leaves with receipt and goods (if any).



Register Item Store Sale Payment ProductCatalog ProductSpecification SalesLineItem Cashier Customer Manager

Chapter 10….

[10 pts] Assume you were going to review the following code. You are to inspect it for consistency in naming, formatting, and understandability of style. You also are going to review it for correctness. Identify all of the things you find that you would raise during a code review. Identify each item by specifying the line number (if appropriate) and the problem.

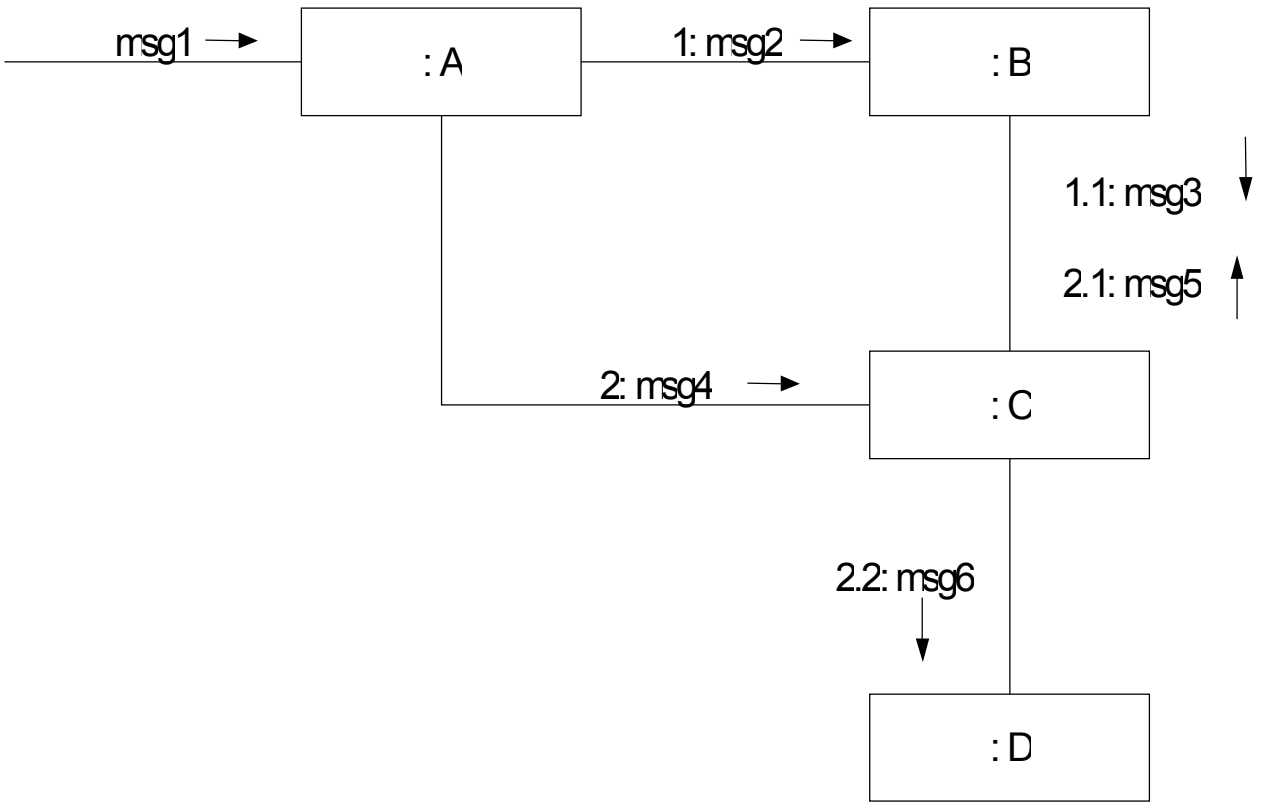
```
1   /**
2    * Method to return the type of triangle represented by three sides.
3    * This only checks for whether a triangle is equilateral, isosceles, or
4    * scalene.
5    * @return a string with a description of the type of triangle
6    * @param side_a the first side
7    * @param side_b the second side, etc.
8    */
9   public String triangleType(int side_a, int b, int c)
10  {
11      if (side_a == b) return TRIANGLE_ISOSCELES;
12      if (side_a == c) {
13          return TRIANGLE_ISOCELES;
14      }
15      if (side_a == b && b == c)
16      {
17          return EQUILATERAL_TRIANGLE;
18      }
19      return SCALENE_TRIANGLE;
20  }
```

(2-pts. for each of the first six, and 4 pts. each for the last two)

- Only two parameters are identified in the javadoc comments.
- The comment says side_b, but the argument is b.
- The args should be named consistently, either side_a, side_b, side_c, or a, b, c.
- Using the underscore in side_a and the mixed-case method name, triangleType, …….are inconsitent naming.
- Inconsistent use of braces on the if statements.
- Inconsistent naming of return types, use either TRIANGLE_ or _TRIANGLE.
- The method will never return EQUILATERAL_TRIANGLE.
- Never checks for side b and c equality.

[10 pts] Consider the following diagram. What kind of diagram is it? Explain what it shows.

NOT COVERED in 2005

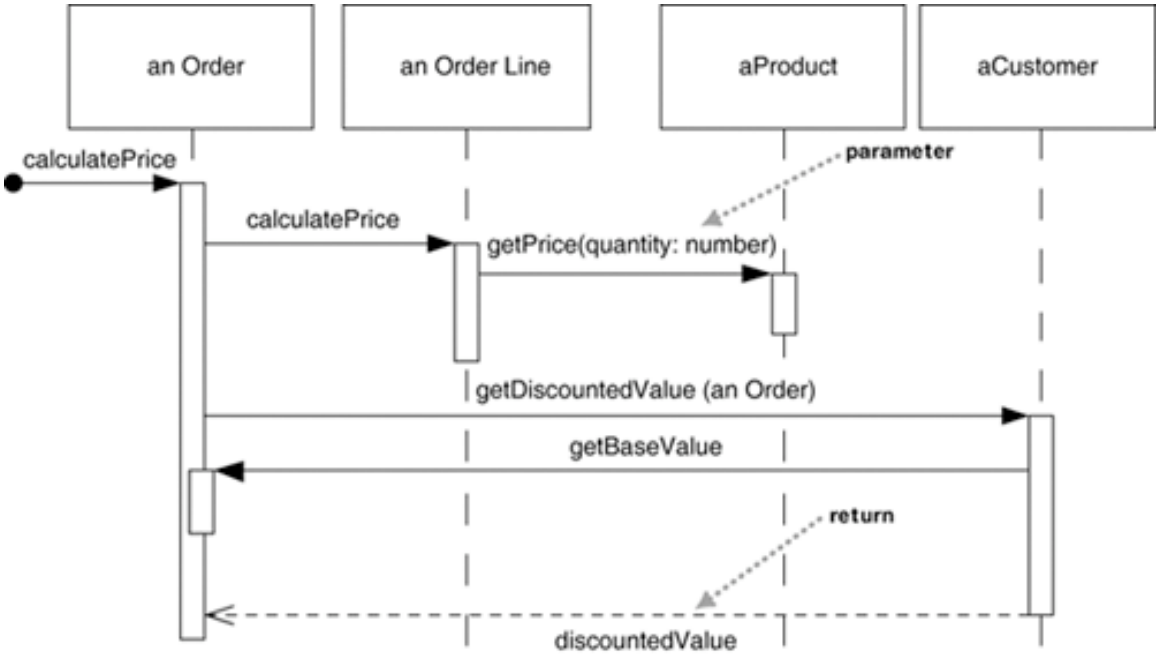


Collaboration diagram.
Msg1 to object of class A causes msg2 to B, which causes msg 3 to C.
Then A sends msg4 to C, and C sends msg 5 to B.
Finally C sends msg 6 to D.

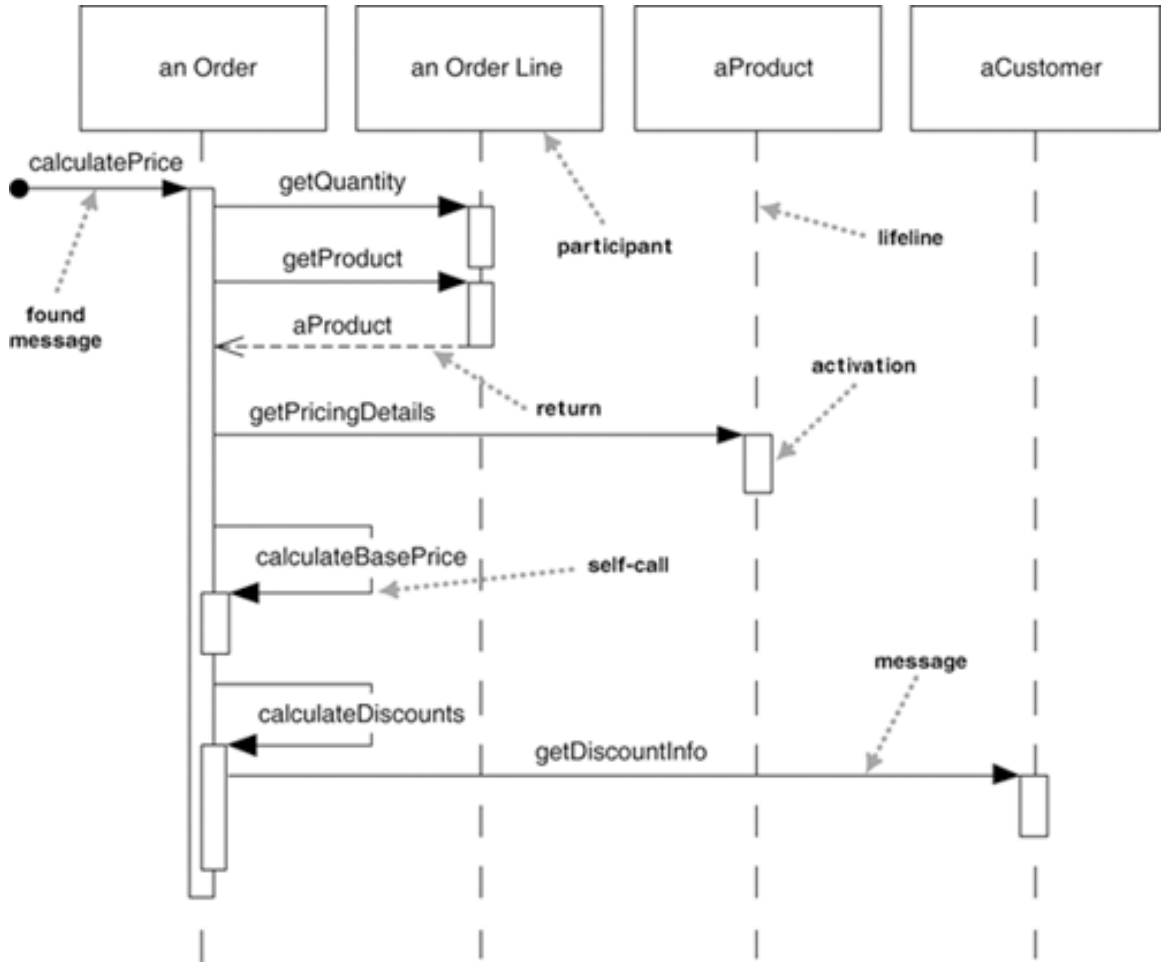
[10 pts] Consider a system with the following 4 domain classes: an Order, representing a full customer order, an OrderLineItem representing one line of the full order, a Product, representing something that a customer might purchase as a part of an order, and a class representing the customer themselves.

Draw a UML sequence diagram representing the following scenario: We have an order and are going to invoke a command on it to calculate its price. To do that, the order needs to look at all the line items on the order and determine their prices, which are based on the pricing rules of the order line's products. Having done that for all the line items, the order then needs to compute an overall discount, which is based on rules tied to the customer. Full credit for an object-oriented, distributed solution (where the Order passes off the price-calculation to the line, and the line to the Product...)

BEST:



too centralized:


an Order
an Order Line
aProduct
aCustomer
calculatePrice
getQuantity
participant
lifeline
getProduct
found message
aProduct
activation
return
getPricingDetails
calculateBasePrice
self-call
message
calculateDiscounts
getDiscountInfo

Two Points each:

24. How are a *workflow*, an *artifact*, and a *baseline* related?

A *workflow* is a set of activities.
An *artifact* is a constituent component of a software product.
A *workflow* creates or modifies one or more artifacts.
A *baseline* is a set of artifacts.

25. What are the differences between *walkthroughs* and *inspections*?

Inspections much more formal. An inspection is a formal five-step process while a walkthrough has two informal steps; previously acquired fault statistics play an important role in the inspection process; there is a formal component of the inspection process for ensuring that all faults noted are later corrected; if more than a certain fraction of the material is changed then it must be submitted for reinspection.

26. Give an example of a nonfunctional requirement that can be handled without having detailed knowledge about the target software product.

"The software product must run under Linux."

27. Why are the attributes of classes but not the methods determined during object-oriented analysis?

The principle of stepwise refinement requires as many decisions as possible to be postponed. All the operations that have to be included in the product ("methods") must eventually appear in the state diagram. However, assigning the methods to specific classes can wait until the design phase. On the other hand, modeling becomes extremely complex unless the attributes are assigned to their specific classes.

In fact, there is another good reason to wait until the design phase before allocating methods to classes, namely that the choice of architecture (for example, client-server) will affect where the classes are physically located, and hence may affect how the operations are organized into methods, and which methods should be allocated to which classes.

28. Define any two of the following design patterns: [*Information Expert, Creator, Controller, Low Coupling, High Cohesion, Polymorphism, Pure Fabrication, Indirection, Don't Talk to Strangers*]

see handout.