CSI 518 Software Engineering
Fall 2000 Midterm Examination
October 31, Tuesday 9:45 - 11:05

Q1: The first Question concerns the following Statement of Need:
Inventory-Tracking System: As part of its expansion into several new and specialized markets, a mail-order catalog company has decided to establish a number of relatively autonomous regional warehouses. Each such warehouse retains local responsibility for inventory management and order processing. To target niche markets efficiently, each warehouse is tasked with maintaining inventory that is best suited to the local market. The specific product line that each warehouse manages may differ from region to region; furthermore, the product line managed by any one region tends to be updated almost yearly to keep up with changing customer tastes. For reasons of economies of scale, the parent company desires to have a common inventory- and order-tracking system across all its warehouses.
The key functions of this system include:

1. Tracking inventory as it enters the warehouse, shipped from a variety of suppliers.
2. Tracking orders as they are received from a central but remote telemarketing organization; order may also be received by mail, and are processed locally.
3. Generating packing slips, used to direct warehouse personnel in assembling and then shipping an order.
4. Generating invoices and tracking accounts receivable.
5. Generating supply requests and tracking accounts payable.

In addition to automating much of the warehouse's daily workflow, the system must provide a general and open-ended reporting facility, so that the management team can track sales trends, identify valued and problem customers and suppliers, and carry out special promotional programs.

1. (10 pts) Write a testable functional requirement and a testable non-functional requirement for the system.
2. (20 pts) In developing this system, what would be the top priority quality attribute and what would be the most critical risk. How would you resolve such risk and how to achieve this quality requirement?
3. Give a high level design of the system based on UML. Your design should include (a) (10 pts) a use case diagram and a sequence diagram (b) (20 pts) the class diagrams (include all the classes in your design) and (c) (10 pts) a statechart diagram, (d) (10pts) calculate the metrics defined in the CK metrics suite for the system you design in (b).

(a) Depth of the inheritance tree (DIT)

(b) Number of Children (NOC)

(c) Response for a Class (RFC).

Q2 (10 points): Describe the structure and the uses of the CMM.

Q3 (10Points) A software system is being designed to satisfy requirements R1, R2, R3 and R4. The design contains four functional components F1, F2, F3 and F4. Each component specification may be viewed as a mathematical function. Furthermore, the system as a whole is required to compute a (single-valued) function of its legal inputs. The engineers have specified component designs that satisfy the following:

$F1(n) \neq F2(n)$ for all legal inputs n
$F3(n) = F4(n)$ for all legal inputs that are also even integers
$F1(n) \neq F3(n)$ for all legal inputs n
$F4(2K) \neq F4(2K+1)$ for all integers K.

A design review has revealed that this particular design relates to the requirements as shown in the matrix below below

	R1	R2	R3	R4
F1	X	X		
F2			X	X
F3	X			
F4				