CS5500, Fall 2004, Test 2

Chapters 1-14. Time 60min. Closed books, notes, except your minds only. Use extra paper as needed, but make sure to identify each answer. If anything is not clear, state a reasonable assumption and answer the question.

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1 (15) Suppose a unit is tested by execution.
   a) What is the advantage of doing so?
   b) What are the disadvantages of doing so?
   c) Suppose we cannot test the unit exhaustively and thus must select some test cases. Name or explain the important kinds of test cases to be run.

2 (10) Suppose we can test the unit exhaustively and verify that it always produces the correct answer.
   a) Can the unit still be unacceptable in any way? In what way, and how would we assess it?
   b) Would the module need to be ever retested (to verify that it still produces correct answers) in the same application? Under what circumstances?

3 (10) For an arbitrary software product, can we perform exhaustive testing to verify correct behavior? Why or how?

4 (10) What are the reusable components in
   a) library architecture
   b) framework architecture

5 (20) You have 3 products to develop P1, P2, and P3. Using COCOMO you determine that they are 20, 50, and 100 person-month respectively. You have 2 contracted teams, T1 and T2, costing you $20k and $30k a month only when they work, respectively, and with 1.0 and 0.5 team multipliers, respectively. Suppose both teams are familiar with all products, but a product must be developed by a single team. What will be task assignment to
   a) Minimize overall time to market
   b) Minimize development cost
   c) Suppose both teams must be paid until all 3 products are completed. Would your answer to b) change and how?

6 (25) Imagine a locomotive with the following controls. There are + and - buttons (each time pressed, they cause the speed to increase/decrease by 1), there is a lever with two positions Forward and Backward (it can be moved only when the locomotive is at rest). There is also a bell that stays on whenever the train is moving backward. There is also a red light that stays on whenever a speed of at least 90 miles per hour is maintained. Finally, there is a speed limit of 100 mph forward and 20 mph backward (increasing speed has no effect). Using the extended notation, draw the State Diagram.