

## CS5500, Fall 2005, Test 2

Chapters 1-14. Time 90min. 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.

YOU MUST RETURN THIS PAGE. NAME \_\_\_\_\_

- 1 (10) Suppose a unit is tested by execution.
  - a) What are the advantages 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 a unit exhaustively and thus 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 (as in regression test) in the same application? Under what circumstances?
- 3 (10) If we produce a new product in such a way that 50% of its modules are reused from previous products, about what % savings in cost can we expect and why? Give % and explain.

Suppose your company is hired to develop a new product. You estimate the following:

- actual requirements gatherings will take 1 month for the whole product (cannot be divided)
  - the product is made up of 3 quite independent subsystems (such as payroll, inventory, and GUI), and each can be, respectively (when handled by a nominal team)
    - analyzed in 1, 2, 6 months
    - designed in 2, 2, 3 months
    - implemented in 1, 3, 2 months
    - integrated (all 3 together) 1 month
- 4 (10) If you have just one team, how long will it take to develop the product

Now assume that you have 3 teams TA, TB, and TC, and that a team can be assigned to any of the workflows above and not necessarily on the same subsystem, and that only one team can be assigned to a workflow of a given subsystem. Also assume no iterative development but waterfall.

- 5 (10) If the teams are all nominal, and you want to minimize development time, how long would it take (give the exact schedule who does what and when)
- 6 (15) Now suppose TA is twice as good as nominal, TB is nominal, and TC is twice slower.
  - a) Would #5 change?
  - b) Also suppose you pay TC twice as much as the other two teams, and your objective is to minimize the development cost, and that all teams are contractors that you only pay for actual work. Who

would do what now?

- 7 (15) 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 as introduced in class, draw the State Diagram.
- 8 (20) There is a classical Chief-Programmer team of the leader and 4 others. The leader gets \$100k/year and the others get \$50k/year. Internal costs are additional \$100k/year for the whole team. You are asked to provide arguments evaluating the idea of hiring a non-tech manager for the team. At the end, you have to defend your answer with \$\$\$ numbers. You have to prepare the case. Do it now, stating all assumptions you are making. and looking at all important factors.