

NAME: _____

CMSC 435 final December 14, 2004

5. [10] Consider the axioms:

$$\text{add}(0,x)=x$$

$$\text{add}(\text{succ}(x),y) = \text{succ}(\text{add}(x,y))$$

(a) Prove $1+1=2$

(b) If you add the axiom $\text{add}(x,y)=x$ what happens? Is $1+1$ still equal to 2? What does this mean?

6. [10] What are the following:

(a) Precondition

(b) Postcondition

(c) Invariant

(d) Is Z a functional or non-functional language and why?

(e) In which lifecycle phase is a Z artifact created?

7. [5] Assume 10 defects are inserted into a program. After a week of debugging, 4 of those defects are found, as well as 12 others. If the 6 inserted defects that were not found are also removed, how many defects are likely to remain in the program?

(b) What testing technique is this known as?

8. [15] Give a message sequence chart for the process of buying candy from a vending machine that accepts coins and bills. Describe as many aspects of the design as you think necessary.

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9. [5] Dependability is usually defined in terms of the RMA attributes.

(b) Can pair programming be used in a normal waterfall development? Explain.

(a) What are the RMA attributes?

(b) Give another attribute and explain why it is a dependability attribute.

12. [10] Answer each of the following:

(a) Why is it difficult to use a strict waterfall development if you are using COTS components?

10. [5] Is the CMM a good measure of product quality? Explain.

(b) Give some of the errors made in the Ariane 5 disaster, and how would good software engineering principles have found those before launch.

(b) How can a solid concrete life preserve be ISO 9001 certified?

11. [5] (a) Can a spiral model development be used in an "agile" development project? Explain.

(c) What is n-version programming and why is not very effective?

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13. [5] What is each of the following and what is its role in a project life cycle:

(a) Milestone

(b) Use case

(c) Sprint

(d) User story

(e) Metaphor