

ICS 52 – Introduction to Software Engineering
Final Exam – Winter, 2007

Last Name: _____ First Name: _____

1. (8 points, 4 points each) Define the following terms, as used in software engineering:

A. Testing oracle.

B. Regression testing

2. (12 points) Although "testing" is sometimes thought of as a phase in the software life cycle, it can also be viewed as a set of verification and validation activities performed throughout the software life cycle. Match each phase below to one or more activities that would typically be performed as part of that phase. Write **R, D, I** or **M** next to each activity.

<u>Phase</u>	<u>Activity</u>
Requirements	check consistency between design and implementation
	test requirements specification
	execute tests
Design	test the design
	repeat other activities as part of redevelopment
	determine test strategy
Implementation	check consistency between design and requirements
	evaluate the software architecture
	generate functional test data
Maintenance	generate structural and func. test data (matches 2)
	test implementation

3. (20 points) You have been assigned to do black box testing of the `remove()` method in `java.util.ArrayList`. Here is part of that method's documentation:

```
public boolean remove(Object o)
```

Removes a single instance of the specified element from this list, if it is present.

Returns `true` if the list contained the specified element (or equivalently, if the list changed as a result of the call).

- (a) What is the input domain of `remove()`?
- (b) What is a basis for dividing the input domain you described into subdomains?
- (c) Using the basis defined in (b), specify 3 or 4 subdomains.
- (d) For each subdomain from (c), give a test case input and the expected output.

4. (15 points) Since testing is never complete, we need to have some criterion for determining whether a certain amount of testing is adequate. Define the following three categories of test adequacy criteria:

Coverage-based testing

Fault-based testing

Error-based testing

Which category or categories apply to homework 4? Explain why.

5. (10 points) According to Dijkstra, "Program testing can be used to show the presence of bugs, but never to show their absence." Is Dijkstra's dictum true if the program testing achieves node coverage? Explain why or why not.

6. (10 points) The software engineering activity of testing is influenced by the general software engineering process. Select one software process model discussed in lecture or in the textbook, other than the waterfall model or the spiral model. What special issues in testing might arise when this model is being followed?

Process model: _____

7. (10 points) What is the difference between "white-box" testing and "black-box" testing?

8. (15 points) This course has had a fair amount of emphasis on "modeling."

Explain what modeling means in the context of Software Engineering. Explain why models are particularly important in this field.

Name and describe one type of model discussed in lecture or the textbook. What are its benefits? Its limitations or drawbacks?

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