

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

Last Name: _____ First Name: _____

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

A. Testing oracle.

A mechanism for determining whether a test output is correct / for Determining the expected output.

B. Regression testing

Application of previously developed test cases, applied after software maintenance to make sure new errors have not been introduced.

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	I check consistency between design and implementation
	R test requirements specification
	I execute white box test cases
Design	D test the design
	M repeat other activities as part of redevelopment
	R determine overall testing strategy
Implementation	D check consistency between design and requirements
	D evaluate the software architecture
	R generate functional test data
Maintenance	D,I generate structural and functional test data (matches 2)
	I test implementation

3. (20 points) You have been assigned to design test cases for black box testing of the `equalsIgnoreCase` method in `java.lang.String`. Here is part of that method's documentation:

```
public boolean equalsIgnoreCase(String anotherString)
    Compares this String to another String, ignoring case considerations. Two
    strings are considered equal ignoring case if they are of the same length, and
    corresponding characters in the two strings are equal ignoring case.
```

- (a) What is the input domain of the `equalsIgnoreCase` method?

4 pts for each section.

Two strings. (-2 if just “a string”)

- (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) The textbook describes several “static” manual techniques for checking software validity without executing a program (in contrast to “dynamic” techniques which we usually call “testing”). One of those static techniques is “reading,” meaning careful reading and rereading of our own or others’ source code. Name and briefly describe one other static manual technique described in the textbook.

See p. 415 and after.

5. (15 points) We’ve discussed various desirable qualities in software. Name and define a desirable quality in a set of test cases. How could you ensure that a set of test cases actually had this quality – that is, how could you test the test cases?

Some common errors:

- **identifying a quality in software and showing how it could be tested for**
- **choosing a quality that is very difficult to achieve, such as “correctness” and then answering without acknowledging the difficulties**
- **not being clear about how the ensuring works, e.g. suggesting we can ensure node coverage by using a control flow graph, but not saying how the process would work**

6. (5 points) In which quadrant of the spiral model (NW, NE, SW, or SE) does testing occur?

SE

7. (5 points) For white box testing, it can be helpful to abstract away the meaning of each statement in a program and focus on the relationships between the instructions, primarily which instruction can be executed after another one. What is the tool we used to focus on this?

Control flow graph

8. (5 points) What is the role of the “basis” in equivalence partitioning?

To divide the domain of all possible inputs into subdomains

9. (5 points) What is the name of a software architecture or design pattern that identifies three components, one which encapsulates the system’s data, one which displays the data, and one which handles input actions from the user?

Model View Controller

10. (5 points) What is the difference between white-box testing and black-box testing?

They have different ways of choosing test cases. 2 points for describing the two approaches without identifying this difference.

11. (5 points) How does software engineering differ from computer programming?

Many interesting, and some surprising, responses.