

ICS 52 – Introduction to Software Engineering
Final Exam – Winter, 2011

First Name: _____ KEY _____ Last Name: _____

1	2	3	4	5	6	7	Total
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1. (12 points) In homework 4, you used (hopefully) a technique for selecting test cases called equivalence partitioning. This technique has several steps. List those steps, and briefly explain what is done in each one.

1. Identify the set of all possible inputs.

2. Select a basis for dividing that set into subsets/subdomains.

3. Using that basis, define two or more subdomains.

4. Select one (or more) test case input from each subdomain.

2. (10 points) The textbook distinguishes *dynamic* testing techniques (which execute code) and *static* techniques (which don't). Name and briefly describe one static technique described in lecture or the textbook. Describe a situation where this static technique is superior to a dynamic approach.

Reading Peer review Done by the compiler (lint)
Walkthrough Inspection Fagan Inspection
Correctness Proof Stepwise Abstraction

Section 13.4

3. (20 points) You have been assigned to design test cases for black box testing of the two argument add method in `java.util.Vector<E>`. Here is part of its documentation:

6 pts each for a, b, c; 7 pts for d.

```
public void add(int index, E element)
```

Inserts the specified element at the specified position in this Vector. Shifts the element currently at that position (if any) and any subsequent elements to the right (adds one to their indices).

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

Vector object (this), an int, an object of type E.

- (b) What is a basis for dividing the input domain you described into subdomains?

One example: value of index.

Points off if not a well-defined basis for dividing the input domain.

- (c) Using the basis defined in (b), specify 3 or 4 subdomains.

Negative, 0, 1, length of Vector object, greater than length of Vector object.

- (d) For each subdomain from (c), give a test case input and the expected output.

Common mistake: leaving out the Vector.

4. (28 points) Define the following terms, as used in Software Engineering:

Test-driven development

p. 421

Error-based testing

p. 409

Control-flow coverage

p. 431-433

Failure (in contrast to error, fault, mistake)

p. 410

White-box testing

Selecting test cases using criteria informed by the source code.

Oracle

A mechanism or process for determining the correct outcome of a test case.

Information Hiding

5. (15 points) Draw and label a diagram of the spiral software process model.

p. 62.

3 pts for overall structure; 3 pts for each quadrant

6. (15 points) The modularity of a design can be evaluated by the criteria of “cohesion” and “coupling.”

Define cohesion, in the context of software modularity.

See 12.1.2. The parts are worth 5 points each.

Define coupling, in the context of software modularity.

Is it best to have a lot of cohesion or little cohesion? A lot of coupling or little coupling? Explain your answers, referring to at least one software quality or software principle discussed in lecture or the textbook.