

ICS52 - Introduction to Software Engineering
Final Exam – Winter, 2006

Last Name: _____ First Name: _____

Row: _____ Seat Number: _____

1. (16 points, 4 points each) Define the following terms, as used in software engineering:
 - A. Testing oracle.
 - B. Error (in the context of testing).
 - C. Node coverage criterion.
 - D. Regression testing.

2. (10 points) The textbook says that "Walkthroughs and inspections are both manual techniques that spring from the traditional desk-checking of program code." Explain the difference between walkthroughs and inspections. Name one benefit these techniques have that test-case based testing does not.

3. (16 points) You have been assigned to write test cases for black box testing of a function called `isRightTriangle`. Here is part of that function's documentation:

```
public static boolean isRightTriangle(int f, int g, int h)
Returns true if a triangle exists with sides of length f, g, and h, and if that triangle
is a right triangle. Returns false otherwise. Uses the Pythagorean Theorem.
```

- (a) What is the input domain of `isRightTriangle`?
- (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. (10 points) Dijkstra has written, "Program testing can be used to show the presence of bugs, but never to show their absence."

(a) Does this statement hold for structural testing? Explain your answer.

(b) If you answered yes to (a), then why do we perform testing?

5. (10 points) The user, Mary, signs off on a Requirements Specification. When the implementation is delivered, Mary agrees that the software mostly matches the Specification, but says that the system isn't what she had in her mind, because the Specification was incomplete and the programmers interpreted some ambiguous statements in the wrong way. Discuss the relationship between verification and validation, as it pertains to this situation.

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. (13 points) Draw and label a diagram of the waterfall process model.

7. (3 points) In which quadrant of the spiral model is validation and verification performed? (Choose one.)
- A. north-east.
 - B. south-east.
 - C. north-west.
 - D. south-west.
 - E. in all quadrants.
8. (3 points) White box testing and black box testing are identical except for (choose one)
- A. who determines if the output is correct.
 - B. one focuses on errors, the other on faults.
 - C. the color of the box.
 - D. how the test cases are selected.
 - E. when the testing is performed.
9. (3 points) In mutation testing, what is mutated? (Choose one.)
- A. The program source code.
 - B. The program's control flow graph.
 - C. The test cases.
 - D. The expected output.
 - E. The order in which test cases are run.
10. (3 points) "Fault seeding" means (choose one)
- A. growing faults by planting errors.
 - B. growing failures by planting faults.
 - C. deliberately inserting known faults into code.
 - D. ranking certain faults as superior to others.
 - E. stimulating the growth of faults.
11. (3 points) Function point analysis estimates the size of software by (choose one)
- A. counting the number of functions.
 - B. counting the number of function calls.
 - C. counting the number of data types and data structures.
 - D. counting the number of functional units per thousand lines of code.
 - E. observing the direction in which the functions point.