

ICS52 - Introduction To Software Engineering
Final Exam – Fall, 2003

First Name: _____ Last Name: _____

Student ID: _____

1. (24 points, 4 points each) Define the following terms, as used in software engineering:
 - A. Test Case.
 - B. Verification.
 - C. The repository model.
 - D. Stub.
 - E. Architectural design.
 - F. Configuration Management.

2. (16 points) You have been assigned to design test cases for black box testing of the two parameter substring method in java.lang.String. From the documentation:

```
public String substring(int beginIndex, int endIndex)
```

Returns a new string that is a substring of this string. The substring begins at the specified beginIndex and extends to the character at index endIndex - 1. The length of the substring is endIndex-beginIndex. Throws IndexOutOfBoundsException if the beginIndex is negative, or endIndex is larger than the length of this String object, or beginIndex is larger than endIndex.

- (a) What is the input domain of the substring function?
- (b) What is a basis for dividing the input domain you described into subdomains?
- (c) Using the basis from (b), name three or four subdomains.
- (d) For each subdomain from (c), give a test case input and the expected output.

6. (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.

7. (10 points) Below are two alternate versions of part of a School module's design. In each case, the **getStudentsSortedByGradeAndName** method is supposed to return information about the Students in the School, in a specified range of grades, and in alphabetical order by the name of the student.

```
// version 1
class School
{
    Enumeration getStudentsSortedByGradeAndName
                (GradeLevel start, GradeLevel end);
}
```

```
// version 2
class School
{
    Student[] getStudentsSortedByGradeAndName
              (GradeLevel start, GradeLevel end);
}
```

Discuss the relative benefits and shortcomings (if any) of each design approach, referring to specific software qualities and principles discussed in lecture or the textbook.

8. (3 points) Black box testing is another name for (choose the best answer):
- A. Structural testing.
 - B. Verification.
 - C. Unit testing.
 - D. Specification-based testing.
 - E. Stress testing.
9. (3 points) Which of the following is a reason why the complete path coverage condition is almost impossible to achieve? (Choose one.)
- A. The number of execution paths is very large.
 - B. The number of nodes in the control flow graph is very large.
 - C. Each test case can traverse at most n paths, where n is the number of nodes in the control flow graph.
 - D. Some loops in the program would have to be skipped.
 - E. Test cases can only test reachable statements.
10. (3 points) Checking that changes made to a program have not introduced new errors is called (choose one)
- A. Verification.
 - B. Cleanroom inspection.
 - C. Validation.
 - D. Static analysis.
 - E. Regression testing.
11. (3 points) Which of the following is *not* true of integration testing? (Choose the best answer.)
- A. It determines whether modules make compatible assumptions about each other.
 - B. It should be performed before individual programs are tested.
 - C. It can be done in a top-down or bottom-up fashion.
 - D. It often reveals errors due to invalid assumptions about interfaces.
 - E. It typically requires additional software called drivers.