

Software Testing Comprehensive Study Guide

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The comprehensive will consist of five questions, of which you must answer four. All of the questions will come from this study guide.

Do not attempt more than four questions on the exam. If you answer five, pick your best four and *cross out* the fifth, the one you don't want us to grade. If you provide more than four answers, we will pick the four that are the most convenient for us to grade and we will ignore the other(s). You will not get credit for the best four answers. If you are unlucky, we might grade only your worst four answers. Our selection of the appropriate four questions to grade will be final. If you don't like that, don't answer more than four questions.

Study Materials

The following materials are useful:

- *Lessons Learned in Software Testing (2001)* by Cem Kaner, James Bach, & Bret Pettichord (see especially the chapters on bug advocacy and testing techniques)
- *Black Box Software Testing: Academic Course Notes* (slides and videos) by Cem Kaner & James Bach, at www.testing-education.org/BBST.
- *Classic Testing Mistakes*, Brian Marick, <http://www.testing.com/writings/classic/mistakes.html>
- Cem Kaner & Walter P. Bond, "Software engineering metrics: What do they measure and how do we know?", <http://www.kaner.com/pdfs/metrics2004.pdf>
- Cem Kaner, "What is a good test case?" <http://www.kaner.com/pdfs/GoodTest.pdf>
- Cem Kaner, "The Ongoing Revolution in Software Testing" <http://www.kaner.com/pdfs/TheOngoingRevolution.pdf>
- *Software Testing: A Craftsman's Approach* (2nd ed or 3rd ed) Paul Jorgensen,

Copies of these materials are available online or for loan from the CS Department Graduate Student Library (see Karen Brown).

In addition, you might find it helpful to search the web for relevant articles for some of the questions below. You have plenty of time to prepare for this exam. Do you search. It is not mandatory but it is desirable for you to cite references (formally or informally) during the exam if you find sources on the web that are particularly interesting.

Caution: *There is no agreement on standard terminology in this field, and there are strongly different suggestions about what constitutes good practice. If you rely on the traditional introductory texts on software engineering, for example, you will neither get the detail that you need to succeed on this exam, nor are you likely to pick up discussions of the issues that we expect you to be familiar with. If you are going to take the exam and you have not taken a local course at Florida Tech, we strongly recommend that you read the study materials carefully.*

Sample Questions

The questions on the comprehensive will be drawn from this set.

1. There are several different definitions of *acceptance testing*. For purposes of this question, acceptance testing is done by a representative of the customer, and the goal of acceptance testing is to answer the question, “Should we pay for this program?”
What kinds of tests are you *unlikely* to run as part of an acceptance test effort and what kinds of bugs are you more likely to miss as a result? Give three examples of each and explain your reasoning.
2. A program is structured as follows:
 - It starts with a loop, the index variable can run from 0 to 20. The program can exit the loop normally at any value of the index.
 - Coming out of the loop, there is a case/switch statement that will branch to one of 10 places depending on the value of X. X is a positive, non-zero integer. It has a value from 1 to 10.
 - In 9 of the 10 cases, the program executes X statements and then goes into another loop. If X is even, the program can exit the loop normally at any value of its index, from 1 to X. If X is odd, the program goes through the loop 666 times and then exits. In the 10th case (I am explicitly NOT specifying which of the 10 values of X corresponds to the 10th case), the program exits.
 - (a) Ignore the possibility of invalid values of the index variable or X. How many paths are there through this program? Please show and/or explain your calculations.
 - (b) Which values of X should you test? Explain why you would test these values and why you would not test the others.
3. Define statement coverage, branch coverage, and multicondition coverage. Now describe a small program, describe a set of tests that would completely test it (in terms of statement, branch and multicondition coverage), and describe some bugs that these tests would miss. Your description of the program can be pseudocode, a flowchart, or other simplifying diagram.
4. The Spring and Fall changes between Standard and Daylight Savings time creates an interesting problem for telephone bills.

Focus your thinking on the complications arising from the daylight savings time transitions.

Create a table that shows risks, equivalence classes, boundary cases, expected results and “notes” for a long distance telephone service that bills calls at a flat rate of \$0.05 per minute. Assume that the chargeable time of a call begins when the called party answers, and ends when the calling party disconnects. Your “notes” should explain, for each test, why
5. You are testing the group of functions that let you create and format a table in a word processor (your choice of MS Word or Open Office).

Suppose that a critical requirement for this release is **scalability of the product**. What scalability issues might be present in the table? List three. For each issue, list 2 types of failures that could involve scalability. For each type of failure, describe a good test for it and explain why that is a good test for that type of failure. (There are 6 failures, and 6 tests, in total). (NOTE: When you explain why a test is a good test, make reference to some attribute(s) of good tests, and explain why you think it has those attributes. For example, if you think the test is powerful, say so. But don't stop there, explain what about the test justifies your assertion that the test is powerful.)

6. You are testing the group of functions that let you create and format a spreadsheet.

Think in terms of *persistent data* (other than the data you enter into the cells of the spreadsheet). What persistent data is (or could be) associated with a spreadsheet? List three types. For each type, list 2 types of failures that could involve that data. For each type of failure, describe a good test for it and explain why that is a good test for that type of failure. (There are 6 failures, and 6 tests, in total). (NOTE: When you explain why a test is a good test, make reference to some attribute(s) of good tests, and explain why you think it has those attributes. For example, if you think the test is powerful, say so. But don't stop there, explain what about the test justifies your assertion that the test is powerful.)

7. Consider testing the Microsoft Word function that _____.

- How would you develop a list of risks for this capability? (If you are talking to people, who would you ask and what would you ask them?) (If you are consulting books or records or databases, what are you consulting and what information are you looking for in it?)
- Why is this a good approach for building a list of risks?
- List 10 risks associated with this function.
- For each risk, briefly (very briefly) describe a test that could determine whether there was an actual defect and explain why this is a good test for this risk.

NOTE: The actual exam question might ask for a shorter list of risks.

8. Consider testing the _____ feature.

- How would you develop a list of risks for this capability? (If you are talking to people, who would you ask and what would you ask them?) (If you are consulting books or records or databases, what are you consulting and what information are you looking for in it?)
- Why is this a good approach for building a list of risks?
- List 10 risks associated with this function.
- For *three* of these risks, briefly (very briefly) describe a test that could determine whether there was an actual defect and explain why this is a good test for this risk.

NOTE: The actual exam question will name one well-known word processing feature from the following list: Open a file; Save a file; Save as a web page; Print preview; Paste; View ruler; Insert date and time; Insert a footnote; Insert a page header; Check spelling. In question 9, I will focus more on your process for developing the risk list and on your thinking about tying together risks and tests. In contrast, in question 8, I will pay more attention to the details of your risk list.

9. Imagine that you were testing the AutoCorrect features in Microsoft Word.
 - Explain how you would develop a set of scenario tests that test this group of features.
 - Describe a specific scenario test that you would use to test this feature. It is not necessary to describe your test step-by-step, but it is necessary to provide enough detail that I understand your test.
 - Explain why this is a particularly good scenario test. In your explanation, be explicit about what you consider to be the criteria under which a scenario test is evaluated. (That is, what are the attributes of a good scenario test and how does this test relate to those attributes?)
10. Define a scenario test and describe the characteristics of a good scenario test. Suppose that scenario testing is your primary approach to testing. What controls would you put into place to ensure good coverage? Describe at least three and explain why each is useful.
11. Consider *domain testing* and *specification-based testing*.
 - a. What kinds of bugs are you more likely to find with domain testing than with specification-based testing? Give at least two examples of types of bugs and explain why domain testing is more powerful for each kind.
 - b. What kinds of bugs are you more likely to find with specification-based testing than with domain testing? Give at least two examples of types of bugs and explain why domain testing is less powerful for each kind.
12. What is regression testing? What are some benefits and some risks associated with regression testing? Under what circumstances would you use regression tests?
13. Suppose you use a state model to create a long series of tests. You can decide whether or not the series order or test data selection is random. What should you use as a stopping rule? Compare three alternatives, one of them being that you stop after the program runs without error for a sequence of 200 computer-hours. What assurance do you have of sub-sequence coverage in these cases?
14. Why is it important to design maintainability into automated regression tests? Describe some design (of the test code) choices that will usually make automated regression tests more maintainable.
15. A client retains you as a consultant to help them introduce GUI-level test automation into their processes. What questions would you ask them (up to 7) and how would the answers help you formulate recommendations? For at least three questions, be specific about what answer might lead you to one recommendation and how a different answer would lead to a different recommendation.

16. Imagine that you were testing the Find and Replace feature of Word. Describe four examples of each of the following types of attacks that you could make on this feature, and for each one, explain why your example is a good attack of that kind.

- Input constraint attacks
- Output constraint attacks
- Storage constraint attacks
- Computation constraint attacks.

(Don't give me two examples of what is essentially the same attack. In the exam, I will not ask for all 16 examples, but I might ask for 4 examples of one type or two examples of two types, etc.)

Suggestions for Studying and Answering Essay Questions:

The following article describes my recommendations: <http://kaner.com/wp-content/uploads/2010/09/Answering-Essay-Questions.pdf>

Videos explaining how we grade essay exams:

[Part 1](http://www.testingeducation.org/BBST/videos/BBSTGradingFirstSet.wmv) <http://www.testingeducation.org/BBST/videos/BBSTGradingFirstSet.wmv>

[Part 2: comparative grading of four exam answers](http://www.testingeducation.org/BBST/videos/BBSTGradingSecondSet.wmv)

<http://www.testingeducation.org/BBST/videos/BBSTGradingSecondSet.wmv>

[Slides](http://www.testingeducation.org/BBST/slides/Grading%20Essay%20Exams.pdf) <http://www.testingeducation.org/BBST/slides/Grading%20Essay%20Exams.pdf>