SENG 5811 Homework #1

Date: 2/1/2025
Due: 2/07/2025
Topics: Testing Fundamentals
Problems: 3
Points: 40

This assignment is to be completed individually.
Please submit a PDF of your solutions by the due date.

Problem 1. 12 Points

Ignoring testing principles may lead to undesirable consequences such as the ones listed below. For each of the following, identify at least one testing principle (see session 1 slides) that is most likely to have been overlooked. Briefly (in one or two sentences) explain your reasoning.

a) A verification engineer who had previously worked on safety-critical systems testing adopted testing techniques, which had served well in that domain, to test web applications at a new job. But this testing effort turned out to be consistently late and over-budget.

b) A software development organization that has a comprehensive suite of automated tests, runs those tests routinely and confirms that all tests pass before releasing updated versions of the software. Their latest update, however, caused a major embarrassment when an obvious and easy to catch defect was not detected resulting in a huge number of field reports on that single issue.

c) A large software development team following the waterfall development process, carry out all their test activities in the verification stage of the waterfall process. Their testing effort was found to be much costlier than that of a competitor, though their products were similar in functionality and quality.

d) After a systematic campaign to complete every identified test objective for a project with no open or pending defect reports, a verification team manager truly believed and claimed that "the software is defect free". This perception was not shared by others, but the manager persisted only to be disappointed when reality struck in the form of a user-filed problem report which led to the identification of a previously undetected defect.

Problem 2. 12 Points

A program that we are tasked to test is supposed to read in 3 integer values where each value can range from 1 to 200, check if those values could represent the side lengths of a triangle and produce an output message that indicates what kind of triangle it is:

- **Equilateral** (all 3 sides equal)
- **Isosceles** (exactly 2 of the 3 sides are equal)
- **Scalene** (all 3 sides are of a different length)

Write a list of inputs that you deem *sufficient* to "thoroughly" test this program. Next to each input write the expected output. Feel free to "invent" more output messages if you need them. (Hint: invalid inputs of

For each test case, provide a brief purpose stating why that test case is included (It should typically complete the sentence of the form: "this test is included to exercise the possibility that…."). E.g., such a test case might look like the following:

INPUT	EXPECTED OUTPUT	PURPOSE
(3, 3, 3)	Equilateral	Testing equilateral triangle type is correctly identified.

NOTE: Do not worry about any objective definition of "thoroughness" yet. A sincere attempt to be thorough (as you interpret the word) is what is expected. Attempt to discover cases that may have to be dealt with by the program in special ways other than what is stated explicitly stated.

Problem 3. 6 Points

Suppose that you are developing requirements for a text-editing software. Give an example requirement of each of the following categories that the software must satisfy along with a brief justification explaining why your example is appropriate for that category.

- *Correctness* (exhibiting desired behavior)
- *Safety* (Preventing hazardous behavior)
- *Robustness* (Gracefully failing/degrading when operating in abnormal conditions)

Problem 4. 6 Points

A company is developing a social networking app. As they prepare for release, the company plans to conduct beta testing to measure the reliability of the service. In beta testing, the online social networking service will be open to a limited number of users who will receive invitations from the company to use the product over a month. The selected users are all long-time, enthusiastic, or paid users of other products from this company. Furthermore, the company decided to open this product only to users in the United States during beta testing.

a) How might these testing results (e.g., user feedback) still be misleading with respect to the actual reliability of the software product?

b) What could the company do to mitigate potential issues from this inaccurate estimation?

Problem 5. 8 Points

(A logic puzzle) There are six suspects to a murder: Miss Scarlet, Colonel Mustard, Mrs. White, Mr. Green, Mrs. Peacock, and Professor Plum. They each made the following statements:

- Miss Scarlet: “Mrs. White and I are innocent”
- Colonel Mustard: “Mrs. White, Miss Scarlet, or Mrs. Peacock is guilty”
- Mrs. White: “Mrs. Peacock or Colonel Mustard is guilty”
- Mr. Green: “I am innocent”
- Mrs. Peacock: “Mr. Green and Miss Scarlet are innocent”
- Professor Plum: “Mrs. White, Colonel Mustard, or Mrs. Peacock is guilty”

Assume that there is exactly one guilty person in the group of six, and that everyone told the truth except the guilty person, who lied.

a) Who is guilty? Explain your reasoning with a few sentences.

b) Formulate this problem in propositional logic by using distinct propositional variables for the truthfulness and innocence of each suspect. (Hints: Using logical operators, express each suspect’s statement in logic and then connect it to the suspect’s truthfulness)

[And, of you really feel like using your logical formulations to solve the puzzle you can give it a go with a satisfiability solver, such as Z3]