

Black Box Tests – Part I

Designing test cases using equivalence partitions, boundary value analysis and decision tables

Student names _____ **and** _____

Instructions

Work in pairs – groups of two – and discuss with each other as you complete the exercise.

Each team should have two copies of these sheets (one for each person) so you can use one copy for rough work. Alternatively use scratch paper or an area on the white board for rough work.

Marking

This assignment is marked out of 10.

Due

Hand in or submit to eCentennial your joint solution before you leave class.

This assignment has two goals:

1. To practice techniques for designing black box tests that help ensure good code coverage. The theory is that testing all possible scenarios maximizes chances of following all possible paths through the code. Do not fall into the trap of making assumptions about how the application might be coded.
2. To practice specifying test cases. Clear documentation is important because test implementation and execution might be outsourced to people who have no experience with the business domain or knowledge of the application requirements.

Do not overlook or hesitate to state the obvious and pay attention to detail.

Question 1

A program converts student marks that are input as marks out of 100 to letter grades following the rules below.

A mark of at least 90 earns A+
A mark of at least 80 earns A
A mark of at least 70 earns B
A mark of at least 60 earns C
A mark of at least 50 earns D
A mark below 50 means F (Failure)

If a student is excused from submitting 40% or more of the gradable work for acceptable reasons such as protracted illness, a mark of I (Incomplete) is given. Then the student can make arrangements to submit missing work to complete the course after the end of term.

Note: Numeric marks are recorded accurate to one decimal point (0.1) and should be rounded up to the nearest whole number ($0.5+ \rightarrow 1$) by the grading program.

The **objective** of testing is to ensure that students are assigned the correct letter grade, given their numeric mark.

- a. Draw the diagram to show **equivalence partitions** and **boundary values** that ensure all input values are tested (**0.5 pts**)

Hint: ignore the incomplete situation

- b. (0.5 pts) How many test cases do you think are required for complete coverage? _____
And why? (How many tests do you think are needed for each partition)

- c. (0.5 pts) Describe a test case where the expected result is a pass.

Title: Student gets an A

Setup: (preconditions)

Action or input:

Expected result:

- d. (0.5 pts) Describe a test case where the expected result not a pass

Hint: there are **two** possible non-pass situations. List them here to help form your title.

1 _____ 2 _____

Title:

Setup:

Action or input:

Expected result:

Question 2

When asked for an insurance quotation, an auto insurance company looks up the base rate of insuring a specific make, model and year of car. It then multiplies the base rate by percentages according to the business rules below to calculate the quote for a customer:

- Drivers over 55 years of age with good driving records pay the 90% of the base rate.
- Drivers who are male and under 25 years of age pay 150% of the base rate.
- Anyone who uses the car for business pays a premium of 120% of what they would pay for personal use only.

Example: the base rate for a 2005 Honda Civic might be \$500.00. A retired senior with a good driving record would pay \$450.00 for coverage for insurance to drive 2005 Honda Civic. However, if that senior has a business as a messenger for which he uses the car, his rate becomes \$540.00.

- a. (1 pts) Draw a decision table to calculate the quotation for a client

Hint: start by deciding:

What are the conditions that determine outcomes?

What are the possible outcomes?

Draw your table here:

- b. Use the decision table above to help design test cases for the test objective:

Every driver who requests a quotation is told the correct rate.

Notes:

“Criteria for success” refers to deciding whether application passes the test, not whether the driver gets insurance.

Test Case 1 (1 pts)	Test Case 2 (1 pts)
Identifier/title	Identifier/title
Criteria for success:	Criteria for success:
<i>Details:</i> Preconditions	<i>Details:</i> Preconditions
Operation/Action performed	Operation/Action performed
Postconditions	Postconditions

Question 3 (2 pts)

You are designing tests for an online banking application. A use case allows bank account owners to pay bills from their bank accounts. Before paying bills, an account owner with on-line access, must register payees (typically credit card and utilities providers) so that the bank knows who and how to pay. Then, the account owner can transfer funds from their bank accounts to pay bills on-line.

Scenarios:

The application should complete the bill payment if the bank account has enough funds or cancel otherwise.

- There is no service charge for online bill payment when the bank account has sufficient funds.
- If the bill amount is greater than the account balance, the application should send a notification to the client and charge a service fee of \$5.00. If the bank account is less than \$5.00, it will be left with a small negative balance.

Complete the table to define two test cases for each scenario in this use case.

Test case 1 (1 pts)	Test Case 2 (1 pts)
Use Case scenario: successful bill payment	Use case scenario: bill payment unsuccessful
Identifier/title	Identifier/title
Criteria for success:	Criteria for success:
<i>Details:</i> Preconditions Operation/Action performed Postconditions	<i>Details:</i> Preconditions Operation/Action performed Postconditions

Question 4 (1 pts)

The next phase of the online banking application described in the previous question handles checking accounts and savings accounts instead of generic bank accounts. Bill payment is allowed only on checking accounts under the following business rules (in order of priority):

- a) If the checking account balance is equal or greater to the bill amount, pay the bill.
- b) If the checking account balance is less than the bill amount and the user has prearranged overdraft protection that covers the amount, withdraw a service charge of \$5.00 from the account and pay the bill, letting the account balance go below zero.
- c) If the checking account balance is less than the bill amount and the account owner has a savings account that has enough funds, transfer enough money from the savings account to the checking account to pay the bill, complete payment and leave the checking account with a balance of zero.
- d) If the checking account balance is less than the bill amount and the account owner does not have either overdraft protection or a savings account, do not make payment. Instead, send a notification to the client and charge a service fee of \$5.00, possibly leaving a small negative balance in the checking account.

Decide what black box technique applies and then draw the diagram to represent the conditions and expected results in this phase application development. No test cases are required.