**Assignment: Black-Box Test Design Techniques**

Part A: Individual Technique Problems

**Problem 1: Boundary Value Analysis (BVA)**

**System:** Age input between **18–60 (inclusive)**.

* Age < 18 → "Not eligible"
* 18 ≤ Age ≤ 60 → "Eligible"
* Age > 60 → "Not eligible"

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| **Test Case ID** | **Input (AGE)** | **Expected Output** |
| TC01 | 17 | Not Eligible |
| TC02 | 18 | Eligible |
| TC03 | 19 | Eligible |
| TC04 | 59 | Eligible |
| TC05 | 60 | Eligible |
| TC06 | 61 | Not Eligible |

**Problem 2: Equivalence Partitioning (EP)**

**System:** Free shipping between **$50–500 (inclusive)**.

* Purchase < 50 → "Shipping charge applicable"
* 50 ≤ Purchase ≤ 500 → "Free shipping"
* Purchase > 500 → "Special handling required"

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| **Test Case ID** | **Partition** | **Input** | **Expected Output** |
| TC01 | < 50 | 47 | Shipping charge applicable |
| TC02 | 50 - 500 | 250 | Free shipping |
| TC03 | > 500 | 510 | Special handling required |

**Problem 3: State Transition Testing (STT)**

**System:** Login attempts.

* 1st or 2nd fail → "Retry allowed"
* 3rd fail → "Account locked"
* Success → "Welcome"

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| **Test Case ID** | **Pre-Condition** | **Input** | **Expected Result** | **Actual Result** | **Pass** | **Fail** |
| TC01 | Fresh login | Success | Welcome | Welcome | yes | no |
| TC02 | Fresh login | Fail 🡪 Success | Retry Allowed 🡪 Welcome | Same as expected | yes | no |
| TC03 | Fresh login | Fail 🡪 Fail 🡪 Success | Retry Allowed 🡪 Retry Allowed 🡪 Welcome | Same as expected | Yes | no |
| TC04 | Fresh login | Fail 🡪 Fail 🡪 Fail | Retry Allowed 🡪 Retry Allowed 🡪 Account locked | Same as expected | yes | no |
| TC05 | Fresh login | Fail 🡪 Fail 🡪 Fail 🡪 success | Retry Allowed 🡪 Retry Allowed 🡪 Account locked 🡪 Remains locked | Remains locked | yes | no |
| TC06 | Fresh login | Fail 🡪 Fail 🡪 Fail 🡪 Fail | Retry Allowed 🡪 Retry Allowed 🡪 Account locked 🡪 Remains locked | Remains locked | yes | no |
| TC07 | Fresh login | Success 🡪 Fail | Should reset after success 🡪 Fail should reset new session | System continued same session | No | yes |
| TC08 | Fresh login | Fail 🡪 Success 🡪 Fail | Should reset after success 🡪 New session | System continued same session | No | Yes |
| TC09 | Fresh login | Success 🡪 Success | Each should be independent sessions → Welcome, Welcome | System did not reset properly | No | yes |
| TC10 | have been 2 previous failed attempts. | Fail | Third fail should lock account 🡪 Account locked | Account locked | Yes | no |
| TC11 | Account locked | Success | Should remain locked 🡪 No login | System displayed Account locked | Yes | no |
| TC12 | Account locked | Fail | Should remain locked 🡪 Account locked | Same as expected | Yes | No |
| TC13 | Continuous wrong attempts (5+) | Fail 5 times | Lock should occur after 3rd attempt and remain locked | Locked after 3rd, remained locked | Yes | No |
| TC14 | Random mixed sequence | Fail 🡪 Success 🡪 Fail 🡪 Fail 🡪 Success | Each success resets session 🡪 Never lock | welcome | Yes | no |

**Problem 4 — Decision Table Testing (DTT)**

**System:** Student grading system  
Rules:

* If **attendance ≥ 75%** AND **exam score ≥ 40** → **Pass**
* If **attendance < 75%** AND **exam score ≥ 40** → **Repeat Course**
* If **attendance ≥ 75%** AND **exam score < 40** → **Supplementary Exam**
* If **attendance < 75%** AND **exam score < 40** → **Fail**

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| **TC ID** | **Pre-condition** | **Inputs (attendance %, exam score)** | **Expected Result** | |  | | --- | | **Actual Result** |  |  | | --- | |  | | **PASS** | **FAIL** | **Remarks** |
| TC1 (R1-basic) | Normal | 80, 50 | **Pass** |  | ✅ |  | Attendance ≥75 & score ≥40 |
| TC2 (R2-basic) | Normal | 70, 50 | **Repeat Course** |  | ✅ |  | Attendance <75 & score ≥40 |
| TC3 (R3-basic) | Normal | 85, 30 | **Supplementary Exam** |  | ✅ |  | Attendance ≥75 & score <40 |
| TC4 (R4-basic) | Normal | 60, 30 | **Fail** |  | ✅ |  | Attendance <75 & score <40 |
| TC5 (boundary-attendance-low) | Boundary | 75, 40 | **Pass** |  | ✅ |  | Both exactly on boundary → expected Pass |
| TC6 (boundary-attendance-just-below) | Boundary | 74.99, 40 | **Repeat Course** |  | ✅ |  | Slightly below 75 → Repeat Course |
| TC7 (boundary-score-just-below) | Boundary | 75, 39.99 | **Supplementary Exam** |  | ✅ |  | Score just below 40 → Supp. Exam |
| TC8 (boundary-score-exact) | Boundary | 75, 40.0 | **Pass** |  | ✅ |  | explicit float equality check |
| TC9 (max-values) | Robustness | 100, 100 | **Pass** |  | ✅ |  | perfect attendance & score |
| TC10 (min-values) | Robustness | 0, 0 | **Fail** |  | ✅ |  | zero attendance and score |
| TC11 (negative-attendance) | Robustness (invalid) | -5, 50 | **Invalid Input / Reject** (treat as error) |  | ✅ |  | system should validate input — expected: validation error |
| TC12 (attendance>100) | Robustness (invalid) | 120, 50 | **Invalid Input / Reject** |  | ✅ |  | invalid attendance percent |
| TC13 (score negative) | Robustness (invalid) | 80, -1 | **Invalid Input / Reject** |  | ✅ |  | invalid score |
| TC14 (score >100) | Robustness (invalid) | 80, 150 | **Invalid Input / Reject** |  | ✅ |  | invalid score |
| TC15 (decimal-attendance) | Data type check | 75.0, 40 | **Pass** |  | ✅ |  | ensure system handles decimals correctly |
| TC16 (decimal-score) | Data type check | 80, 39.9999 | **Supplementary Exam** |  | ✅ |  | floating precision handling |
| TC17 (trim/spaces input) | Input sanitation | " 75 ", " 40 " | **Pass** |  | ✅ |  | input with whitespace — should be trimmed |
| TC18 (string numeric) | Input sanitation | "75", "40" | **Pass** |  | ✅ |  | numeric strings — depending on spec should be accepted or validated |
| TC19 (missing attendance) | Negative / validation | null, 50 | **Invalid Input / Reject** |  | ✅ |  | missing attendance should be handled |
| TC20 (missing score) | Negative / validation | 80, null | **Invalid Input / Reject** |  | ✅ |  | missing score should be handled |