**Course: CSCN72010 – Software Quality I: Testing Tools and Methodologies (Fall 2025)**

**Assignment 2 (a)**

* Submit a file containing your answers to the **two questions** by the due date. (Read this whole document thoroughly for both questions!)
* You may submit as many times as you want. Only the most recent submission will be graded
* The due date for the assignment is available from your Course Shell.

# Question 1: CFG and Linearly Independent Paths (15 marks): In this question, you are required to analyze a provided Control Flow Graph (CFG).



1. Use cyclomatic complexity (M) to determine the maximum number of linearly independent paths.

2. Identify all linearly independent paths in the CFG.

3. Briefly justify why each path is considered independent.

**Rubrics for evaluation**

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| Criterion | Excellent | Good | Fair | Poor |
| Cyclomatic Complexity | Correct formula and calculation with clear explanation (3 marks). | Correct formula, minor arithmetic mistake (2 marks). | Formula attempted but incomplete (1 mark). | Incorrect or missing (0 marks). |
| Identification of Paths | All paths correctly identified (6 marks). | Most paths identified, minor error (4–5 marks). | Some paths identified, major omissions (2–3 marks). | Few or none identified (0–1 marks). |
| Justification of Paths | Clear reasoning for each path (4 marks). | Most reasoning correct but lacks clarity (3 marks). | Partial reasoning, vague explanations (1–2 marks). | No reasoning provided (0 marks). |
| Clarity & Presentation | Well-organized, correct file format (2 marks). | Minor formatting issues (1.5 marks). | Some clarity issues or wrong format (1 mark). | Disorganized or unreadable (0 marks). |

# Question 2: Basis Path Testing (15 marks): Analyze the following pseudo-code:

def login (user, password, attempts):  
 if user == "admin":  
 if password == "1234":  
 print ("Login successful")  
 else:  
 if attempts > 3:  
 print ("Account locked")  
 else:  
 print ("Try again")  
 else:  
 print ("Unknown user")

1. Construct the CFG for the code.

2. Compute the cyclomatic complexity (M).

3. Identify the basis set of independent paths.

4. Derive a set of test cases that cover all basis paths.

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| Criterion | Excellent | Good | Fair | Poor |
| CFG Construction | CFG fully correct, all branches modeled (3 marks). | CFG mostly correct, small errors (2 marks). | CFG incomplete, major issues  (1 mark). | CFG missing (0 marks). |
| Cyclomatic Complexity | Correct calculation with explanation (2 marks). | Correct formula, minor arithmetic issue (1.5 marks). | Attempted but wrong (1 mark). | No attempt (0 marks). |
| Basis Paths | All independent paths identified (4 marks). | Most paths correct, minor errors (3 marks). | Some correct, major omissions (1–2 marks). | Few or none correct (0 marks). |
| Test Cases | Comprehensive, covers all paths (4 marks). | Mostly covers all paths, some gaps (3 marks). | Covers few paths (1–2 marks). | No test cases or invalid (0 marks). |
| Justification & Clarity | Clear mapping of test cases to paths (2 marks). | Mostly clear, some ambiguity (1.5 marks). | Minimal clarity (1 mark). | Unclear or absent (0 marks). |

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