CSE 4321/5321 Homework 3

Spring 2020

Question Weighting:

Question 1- 5 - 20 % credit each - total 100% credit

Use the EBP approach for each problem.

1. Develop CFG (reduced) and Cyclomatic complexity.
2. Develop basis path set.
3. Determine significance on each variable.
4. Add tests for missing Boundary Values not tested, including extreme range values - extreme range values for EACH variable that has a boundary condition in the code.
5. For basis path use the all true path as the first test case.

Submittal items, **for each problem** ***submit*** the following and number them accordingly

1. Code description
   1. For problem 1 and 2 use a decision table. Use slide 61 of M03 as a guide for the decision table format.
   2. For problems 3 and 4 use a logical expression
   3. For problem 5 draw a graph (can be drawn by hand and scanned in). Make sure axes are labeled with values at each whole number
2. CFG (reduced) - can be hand drawn and scanned
3. Cyclomatic Complexity (indicate on the graph)
4. Test case table with basis paths (put these in the "Basis Path" column. Where tests are addition to basis path set use a "-" in the basis path column. Make sure all true is the first BP.
5. Code coverage achieved
6. Test cases support or refute description?

Assume:

1. a significance of 1 Cent on financial calculations
2. Assume 0.1 on all doubles, unless otherwise specified.
3. Use Excel's default of rounding to the significance. For financial display $0.00 and doubles 0.0 except as otherwise indicated - this will implicitly round to the significance.

Proper application of the CFG to the basis path

1. **Start at the upper left and work toward the lower right of the CFG flipping decisions from upper left toward lower right. Make sure to put nodes at subsequent levels on the CFG. See slides 41-44 of M09**

1) Use basis path testing to develop the test cases for the following code. Use the line (statement) numbers below in your CFG.



Test case table format:



SOLUTION

1. Code description



2. and 3. CFG and Cyclomatic Complexity



ECP/BV (not required)

4. Test case table and Basis Path set. The first 7 test cases must be in this order.



5. We have achieved decision, statement, full BV and extreme range coverage.

6. The test cases support the code description.

2) Use basis path testing to develop the test cases for the following code. Use the line (statement) numbers below in your CFG. Assume distance ranges from 0.0 to 2,000.0 feet both inclusive.



Test case table format:



Notes:

1. decision table: ignore the timer and assume red light stays on at or below 50.0 feet
2. timer does not have an extreme range

SOLUTION

1. Code description (either of the following decision tables).

 **OR**



2. and 3. CFG and Cyclomatic Complexity



ECP/BV (not required)



4. Test case table and Basis Path set. The first 7 test cases must be in this order.



5. We have achieved decision, statement, full BV and extreme range coverage.

6. The test cases support the code description.

3) Use basis path testing to develop the test cases for the following code. Use the line (statement) numbers below in your CFG. Assume that cart ranges from $0.00 to $10,000.00 and creditRating from 0 to 850 all inclusive.



Test case table format



Mentally transform statements 9-12 and 14-19 into a multiple condition decision statement as described in slides 41-52 of M09 and show the MCDC test cases for this logical expression in the test case table.

SOLUTION

1. Code description

The equivalent logical expression can be written as:

approved = (member) && ((creditRating >= 650) && (cart <= 5\_000.0) && (cart > 2\_500.0)) ||

(!member) && ((creditRating >= 700) || ((cart <= 3\_500.0) && (cart > 1\_500.0)))

2. and 3. CFG and Cyclomatic Complexity



ECP/BV (not required)



4. Test case table and Basis Path set. The first 8 test cases must be in this order.



5. We have achieved decision, statement, full BV and extreme range coverage.

6. The test cases support the code description.

4) Use basis path testing to develop the test cases for the following code. Use the line (statement) numbers below in your CFG. Assume that cart ranges from $0.00 to $10,000.0, creditRating from 0 to 850 and that yearsMember ranges from 0 to 20 all inclusive.



Test case table format:



Mentally transform statements 9-16 and 18-25 into multiple condition decision statement as described in slides 41-52 of M09 and show the MCDC test cases for this logical expression in the test case table.

SOLUTION

1. Code description

The equivalent logical expression can be written as:

approved = (goldStatus) && ((cart <= 3\_000.00) || (creditRating >= 700) || (yearsMember > 5)) ||

(!goldStatus) && ((cart <= 2\_000.00) || (creditRating >= 750) || (yearsMember > 7))

2. and 3. CFG and Cyclomatic Complexity



4. Test case table and Basis Path set. The first 8 test cases must be in this order.



5. We have achieved decision, statement, full BV and extreme range coverage.

6. The test cases support the code description.

5) Use basis path testing to develop the test cases for the following code. Use the line (statement) numbers below in your CFG. Assume that x ranges from -4.00 to 8.00 both inclusive. Assume both y and y are significant to 0.01 (use Excel's answer without truncation which means it will round to the 0.01).



Add tests as follows:

1. For each linear region, in the middle of the ECP.
2. For each parabolic - at the max/min and mid-range (mid-range of x) on one side of the max/min. (2 tests total).

**Submit the graph with your solution. Develop your tests using the graph. You may hand draw the graph and scan BUT IT MUST BE GRADEABLE. You must label the axes and show values across each axis at points of interest.**

Test Case table format



SOLUTION

1. Code description (graph)



2. and 3. CFG and Cyclomatic Complexity



ECP/BV (not required)



4. Test case table and Basis Path set. The first 5 test cases must be in this order.



5. We have achieved decision, statement, full BV and extreme range coverage.

6. The test cases support the code description.