

SYSC 4101

Laboratory 8

Exercise 1 [10+10=20 marks]

Consider the following predicate: $P = A \text{ or } (B \text{ and not}(C))$

Question 1: [10 mark] Apply the Restricted Active Clause Coverage criterion to identify tests.

Question 2: [10 mark] What are the Unique true points for P? What are the Near false points for P?

Exercise 2 [40 marks]

Consider the piece of code below.

```
1  int foo(int a, int b, int c) {
2      int d;
3      if (a > 12 && b < 45) {
4          if (c > 4 || b > 0) {
5              d = 1;
6          }
7          else {
8              d = 2;
9          }
10     }
11     else
12         d = 3;
13     return d;
14 }
```

Question 1: [5 mark] Create the control flow graph for this piece of code (condensed form, node labels after line numbers, T/F labels on edges).

Question 2: [5 marks] Confirm that the following test suite {TC1, TC2, TC3} is All-Edges adequate.

Test Case 1 (TC1): (a=20, b=20, c=20)

Test Case 2 (TC2): (a=20, b=-20, c=0)

Test Case 3 (TC3): (a=0, b=45, c=20)

Question 3: [10 marks] Apply the Restricted Active Clause Coverage (RACC) criterion separately to each of the two predicates included in this piece of code.

Remember that a clause is a predicate that does not contain any logical operator. So, in predicate “(a > 12 && b < 45)”, “a > 12” is a clause but “a” is not a clause.

Question 4: [10 marks] Is test suite {TC1, TC2, TC3} adequate for the RACC criterion? If not, which test requirements are not met and suggest new test cases to create a RACC adequate test suite?

Question 5: [10 marks] Identify Unique True Points and Near False Points separately for the two predicates in this piece of code.

Exercise 3 [20 marks]

Consider the following predicate:

$$P = (a \ \&\& \ b) \ || \ (b \ \&\& \ !c) \ || \ (!c).$$

Question A: [10 mark] Apply the Restricted Active Clause Coverage (RACC) criterion.

Question B: [10 mark] Find Unique True Points (UTPs) and Near False Points (NFPs).

Note 1: if you are using cube representations, use the lexicographical order of clauses in your cube representation.

Note 2: Even though the predicate is not a minimal disjunctive normal form, you are asked to apply the criteria on this form of the predicate. You are not asked to minimize. The exercise is about applying the criteria in situations where the predicate does not have the expected form or is not minimized, and observe what happens, i.e., what results we obtain in such situations.

Exercise 4 [30 marks]

Consider the predicate $P = (A \ \&\& \ !B) \ || \ !C$.

Question A: [10 marks] Apply the RACC criterion to this predicate.

Question B: [10 marks] Find UTPs and NFPs for this predicate.

Question C: [10 marks] Suppose this predicate is the guard condition of an extended finite state machine, and that clauses A, B and C are comparing variables a, b, and c as follows: A is $a > b$, B is $b \leq c$ and C is $c \leq a$. Does any of the test requirements you identified in the previous two questions become unfeasible?

Note: if you are using cube representations, use the lexicographical order of clauses in your cube representation.

Exercise 5 [10 marks]

Consider the predicate $P = (A \ \&\& \ !B) \ || \ (!A \ \&\& \ D) \ || \ (!C \ \&\& \ !D)$.

Find UTPs and NFPs for this predicate.

Note: if you are using cube representations, use the lexicographical order of clauses in your cube representation.