**Example**

For the given predicate below, answer the questions a through i.

p = a ∧ (b ∨ c)

* 1. List the clauses that go with predicate p.

**Answer:**

Clauses are a, b, c.

* 1. By using the mathematical approach compute and simplify the conditions under which each clause determines predicate p. Be sure to include details or steps showing how you compute and simplify.

**Answer:**

**pa**  = pa=true ⊕ pa=false

= (true ∧ (b ∨ c)) ⊕ (false ∧ (b ∨ c))

= (b ∨ c) ⊕ false

= b ∨ c

**pb**  = pb=true ⊕ pb=false

= (a ∧ (true ∨ c)) ⊕ (a ∧ (false ∨ c))

= (a ∧ true) ⊕ (a ∧ c)

= a ⊕ (a ∧ c)

= a ∧ ¬c

**pc**  = pc=true ⊕ pc=false

= (a ∧ (b ∨ true)) ⊕ (a ∧ (b ∨ false))

= (a ∧ true) ⊕ (a ∧ b)

= a ⊕ (a ∧ b)

= a ∧ ¬b

* 1. Write the complete truth table for all clauses. Label your rows starting from 1.

Use the format in the examples we covered in lecture. That is, row 1 should be all clauses true. You should include columns for the conditions under which each clause determines the predicate, and also a column for the value of the predicate itself.

**Answer:**

**Empty cells in the table below represent false.**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **row** | **a** | **b** | **c** | **p** | **pa** | **pb** | **pc** |
| 1 | T | T | T | T | T |  |  |
| 2 | T | T |  | T | T | T |  |
| 3 | T |  | T | T | T |  | T |
| 4 | T |  |  |  |  | T | T |
| 5 |  | T | T |  | T |  |  |
| 6 |  | T |  |  | T |  |  |
| 7 |  |  | T |  | T |  |  |
| 8 |  |  |  |  |  |  |  |

* 1. Give a list of pairs of rows from your table that satisfy Clause Coverage (CC) but does not satisfy Predicate Coverage (PC)

**Answer:**

Clause Coverage requires each clause to take T, F values once (regardless of the predicate value), whereas Predicate Coverage requires the predicate to take T, F values once.

**(4,5)** as each clause takes T and F value once, but the predicate (p) is F in both cases.

* 1. List all pairs of rows from your table that satisfy General Active Clause Coverage (GACC) with respect to each clause.

**Answer:**

Set of possible tests:

Major clause a: {(1,5), (1,6), (1,7), (2,5), (2,6), (2,7), (3,5), (3,6), (3,7)}

Major clause b: {(2,4)}

Major clause c: {(3,4)}

* 1. List all pairs of rows from your table that satisfy Correlated Active Clause Coverage (CACC) with respect to each clause.

**Answer:**

Set of possible tests (Same as GACC):

Major clause a: {(1,5), (1,6), (1,7), (2,5), (2,6), (2,7), (3,5), (3,6), (3,7)}

Major clause b: {(2,4)}

Major clause c: {(3,4)}

* 1. List all pairs of rows from your table that satisfy Restricted Active Clause Coverage (RACC) with respect to each clause.

**Answer:**

Set of possible tests:

Major clause a: {(1,5), (2,6), (3,7)}

Major clause b: {(2,4)}

Major clause c: {(3,4)}

* 1. List all 4-tuples of rows from your table that satisfy General Inactive Clause Coverage (GICC) with respect to each clause. List any infeasible GICC test requirements.

**Answer:**

|  |  |  |
| --- | --- | --- |
| Major clause | Set of possible tests | |
| **a** | P = T | No feasible pairs |
| P = F | (4,8) |
| **b** | P = T | (1,3) |
| P = F | (5,7), (5,8), (6,7), (6,8) |
| **c** | P = T | (1,2) |
| P = F | (5,6), (5,8), (7,6), (7,8) |

* 1. List all 4-tuples of rows from your table that satisfy Restricted Inactive Clause Coverage (RICC) with respect to each clause. List any infeasible RICC test requirements.

**Answer:**

|  |  |  |
| --- | --- | --- |
| Major clause | Set of possible tests | |
| **a** | P = T | No feasible pairs |
| P = F | (4,8) |
| **b** | P = T | (1,3) |
| P = F | (5,7), (6,8) |
| **c** | P = T | (1,2) |
| P = F | (5,6), (7,8) |