



تمرین پنجم درس آزمون نرم افزار

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بردیا اردکانیان

۹۸۳۱۰۷۲

استاد درس: دکتر گوهری

بهار ۱۴۰۲

7.4

Q4

Use the following methods `trash()` and `takeOut()` to answer questions a-c.

```

1 public void trash (int x)    15 public int takeOut (int a, int b)
2 {                            16 {
3   int m, n;                  17   int d, e;
4                               18
5   m = 0;                      19   d = 42*a;
6   if (x > 0)                  20   if (a > 0)
7     m = 4;                    21     e = 2*b+d;
8   if (x > 5)                  22   else
9     n = 3*m;                  23     e = b+d;
10  else                        24   return (e);
11    n = 4*m;                  25 }
12  int o = takeOut (m, n);
13  System.out.println ("o is: " + o);
14 }

```

(a) Give all call sites using the line numbers given.

خط ۱۲، تابع `trash()`، فراخوانی `takeout()`.

(b) Give all pairs of *last-defs* and *first-uses*.

1. $(trash(), m, 5) \rightarrow (takeOut(), a, 19)$
2. $(trash(), m, 7) \rightarrow (takeOut(), a, 19)$
3. $(trash(), n, 9) \rightarrow (takeOut(), b, 21)$
4. $(trash(), n, 9) \rightarrow (takeOut(), b, 23)$
5. $(trash(), n, 11) \rightarrow (takeOut(), b, 21)$
6. $(trash(), n, 11) \rightarrow (takeOut(), b, 23)$
7. $(trash(), e, 21) \rightarrow (takeOut(), o, 13)$
8. $(trash(), e, 23) \rightarrow (takeOut(), o, 13)$

(c) Provide test inputs that satisfy *all-coupling-uses* (note that `trash()` only has one input).

$$x = 0 \rightarrow 1, 6, 8$$

$$x = 1 \rightarrow 2, 5, 7$$

$$x = 6 \rightarrow 2, 3, 7$$

تست ۴ برآورده نمی شود چون اگر در `trash()` داشته باشیم $x > 5, m = 4$ در تابع `takeOut()` مقدار x از ۰ بزرگ تر خواهد بود.

8.1

Q4

Use predicates (i) through (x) to answer the following questions. Verify your computations with the logic coverage tool on the book website.

v. $p = a \oplus b$

ix. $p = a \vee b \vee (c \wedge d)$

x. $p = (a \wedge b) \vee (b \wedge c) \vee (a \wedge c)$

(a) List the clauses that go with predicate p .

(b) Compute (and simplify) the conditions under which each clause determines predicate p .

(c) Write the complete truth table for each clause. Label your rows starting from 1. Use the format in the example underneath the definition of Combinatorial Coverage in [Section 8.1.1](#). 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.

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

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

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

(g) 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.

(h) 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.

V.

a)

a, b

b)

$p_a = T, p_b = T$

c)

	a	b	p	p_a	p_b
1	T	T	F	T	T
2	T	F	T	T	T
3	F	T	T	T	T
4	F	F	F	T	T

d)

$$a \rightarrow \{1, 2\} \times \{3, 4\}$$

$$b \rightarrow \{1, 3\} \times \{2, 4\}$$

e)

$$a \rightarrow (1, 3), (2, 4)$$

$$b \rightarrow (1, 2), (3, 4)$$

f)

$$a \rightarrow (1, 3), (2, 4)$$

$$b \rightarrow (1, 2), (3, 4)$$

g)

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h)

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IX.

a)

a, b, c, d

b)

$$p_a = \neg b \wedge (\neg c \vee \neg d)$$

$$p_b = \neg a \wedge (\neg c \vee \neg d)$$

$$p_c == \neg a \wedge \neg b \wedge \neg d$$

$$p_d == \neg a \wedge \neg b \wedge \neg c$$

c)

	a	b	c	d	p	p_a	p_b	p_c	p_d
1	T	T	T	T	T				
2	T	T	T	F	T				
3	T	T	F	T	T				
4	T	T	F	F	T				
5	T	F	T	T	T				
6	T	F	T	F	T	T			
7	T	F	F	T	T	T			
8	T	F	F	F	T	T			
9	F	T	T	T	T				
10	F	T	T	F	T		T		
11	F	T	F	T	T		T		
12	F	T	F	F	T		T		
13	F	F	T	T	T			T	T
14	F	F	T	F		T	T		T
15	F	F	F	T		T	T	T	
16	F	F	F	F		T	T		

d)

$$a \rightarrow \{6, 7, 8\} \times \{14, 15, 16\}$$

$$b \rightarrow \{10, 11, 12\} \times \{14, 15, 16\}$$

$$c \rightarrow (13, 15)$$

$$d \rightarrow (13, 14)$$

e)

$$a \rightarrow \{6, 7, 8\} \times \{14, 15, 16\}$$

$$b \rightarrow \{10, 11, 12\} \times \{14, 15, 16\}$$

$$c \rightarrow (13, 15)$$

$$d \rightarrow (13, 14)$$

f)

$$a \rightarrow (6, 14), (7, 15), (8, 16)$$

$$b \rightarrow (10, 14), (11, 15), (12, 16)$$

$$c \rightarrow (13, 15)$$

$$d \rightarrow (13, 14)$$

g)

$$a \rightarrow p = F \rightarrow \{ \}$$

$$a \rightarrow p = T \rightarrow \{1, 2, 3, 4, 5\} \times \{9, 10, 11, 12, 13\}$$

$$b \rightarrow p = F \rightarrow \{ \}$$

$$b \rightarrow p = T \rightarrow \{1, 2, 3, 4, 9\} \times \{5, 6, 7, 8, 13\}$$

$$c \rightarrow p = F \rightarrow (14, 16)$$

$$c \rightarrow p = T \rightarrow \{1, 2, 5, 6, 9, 10\} \times \{3, 4, 7, 8, 11, 12\}$$

$$d \rightarrow p = F \rightarrow (15, 16)$$

$$d \rightarrow p = T \rightarrow \{1, 3, 5, 7, 9, 11\} \times \{2, 4, 6, 8, 10, 12\}$$

h)

$$a \rightarrow p = F \rightarrow \{ \}$$

$$a \rightarrow p = T \rightarrow (1, 9), (2, 10), (3, 11), (4, 12), (5, 13)$$

$$b \rightarrow p = F \rightarrow \{ \}$$

$$b \rightarrow p = T \rightarrow (1, 5), (2, 6), (3, 7), (4, 8), (9, 13)$$

$$c \rightarrow p = F \rightarrow (14, 16)$$

$$c \rightarrow p = T \rightarrow (1, 3), (2, 4), (5, 7), (6, 8), (9, 11), (10, 12)$$

$$d \rightarrow p = F \rightarrow (14, 16)$$

$$d \rightarrow p = T \rightarrow (1, 2), (3, 4), (5, 6), (7, 8), (9, 10), (11, 12)$$

X.

a)

a, b, c

b)

$$p_a = b \wedge \neg c \vee \neg b \wedge c$$

$$p_b = a \wedge \neg c \vee \neg a \wedge c$$

$$p_b = a \wedge \neg b \vee \neg a \wedge b$$

c)

	a	b	c	p	p_a	p_b	p_c
1	T	T	T	T			
2	T	T	F	T	T	T	
3	T	F	T	T	T		T
4	T	F	F			T	T
5	F	T	T	T		T	T
6	F	T	F		T		T
7	F	F	T		T	T	
8	F	F	F				

d)

$$a \rightarrow \{2, 3\} \times \{6, 7\}$$

$$b \rightarrow \{2, 5\} \times \{4, 7\}$$

$$c \rightarrow \{3, 5\} \times \{4, 6\}$$

e)

$$a \rightarrow \{2, 3\} \times \{6, 7\}$$

$$b \rightarrow \{2, 5\} \times \{4, 7\}$$

$$c \rightarrow \{3, 5\} \times \{4, 6\}$$

f)

$$a \rightarrow (2, 6), (3, 7)$$

$$b \rightarrow (2, 4), (5, 7)$$

$$c \rightarrow (3, 4), (5, 6)$$

g)

$$a \rightarrow p = F \rightarrow (4, 8)$$

$$a \rightarrow p = T \rightarrow (1, 5)$$

$$b \rightarrow p = F \rightarrow (6, 8)$$

$$b \rightarrow p = T \rightarrow (1, 3)$$

$$c \rightarrow p = F \rightarrow (7, 8)$$

$$c \rightarrow p = T \rightarrow (1, 2)$$

h)

$$a \rightarrow p = F \rightarrow (4, 8)$$

$$a \rightarrow p = T \rightarrow (1, 5)$$

$$b \rightarrow p = F \rightarrow (6, 8)$$

$$b \rightarrow p = T \rightarrow (1, 3)$$

$$c \rightarrow p = F \rightarrow (7, 8)$$

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$$c \rightarrow p = T \rightarrow (1, 2)$$