HW1

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a. Truth table

X1	X2	X3	a	b	z
0	0	0	1	1	0
0	0	1	1	0	0
0	1	0	1	0	0
0	1	1	1	0	0
1	0	0	1	1	0
1	0	1	1	0	0
1	1	0	0	0	1
1	1	1	0	0	1

```
alumni [/u/cs/104/0413249] -zyliu- g++ 108061532.cpp
alumni [/u/cs/104/0413249] -zyliu- ./a.out
Truth table
x1 = 0 x2 = 0 x3 = 0 a = 1 b = 1 z = 0

x1 = 0 x2 = 0 x3 = 1 a = 1 b = 0 z = 0

x1 = 0 x2 = 1 x3 = 0 a = 1 b = 0 z = 0

x1 = 0 x2 = 1 x3 = 1 a = 1 b = 0 z = 0

x1 = 1 x2 = 0 x3 = 0 a = 1 b = 1 z = 0

x1 = 1 x2 = 0 x3 = 1 a = 1 b = 0 z = 0

x1 = 1 x2 = 1 x3 = 0 a = 0 b = 0 z = 1

x1 = 1 x2 = 1 x3 = 1 a = 0 b = 0 z = 1
```

b. Report the cardinalities of the ON-SET and the OFF-SET of the internal signals a, b, and primary output signal z, respectively

ANS:

ON SET cardinality of signal a = 6, signal b = 2, signal z = 2

OFF SET cardinality of signal a = 2, signal b = 6, signal z = 6

c. Find out all input vectors that can excite signal a stuck-at-1 fault. List your results as a table and report their total number.

ANS:

input vector (x1,x2,x3) = (1,1,0) , (1,1,1)

Total number = 2

d. Find out all input vectors that can test signal a stuck-at-0 fault. List your results as a table and report their total number.

ANS:

input vector (x1,x2,x3) = (0,0,1), (0,1,0), (0,1,1), (1,0,1)

Total number = 4

```
All input vectors that can test signal 'a' stuck-at-0 fault
x1 = 0 x2 = 0 x3 = 0 a = 1 b = 1 z = 0 fault_a = 0
x1 = 0 x2 = 0 x3 = 1 a = 1 b = 0 z = 0 fault_a = 1  This input vector can test
x1 = 0 x2 = 1 x3 = 0 a = 1 b = 0 z = 0 fault_a = 1  This input vector can test
x1 = 0 x2 = 1 x3 = 1 a = 1 b = 0 z = 0 fault_a = 1  This input vector can test
x1 = 1 x2 = 0 x3 = 0 a = 1 b = 1 z = 0 fault_a = 0
x1 = 1 x2 = 0 x3 = 1 a = 1 b = 0 z = 0 fault_a = 1  This input vector can test
x1 = 1 x2 = 1 x3 = 0 a = 0 b = 0 z = 1 fault_a = 1
x1 = 1 x2 = 1 x3 = 1 a = 0 b = 0 z = 1 fault_a = 1
Total number of test vectors = 4
```

e. Try to reason if there is any input vector that can test an “AND-bridging fault” occurring between signals a and signal b? If yes, find out all these test vectors as a table and report their total number

ANS:

Yes, input vector(x1,x2,x3) = (0,0,1), (0,1,0), (0,1,1), (1,0,1)

Total number = 4

```
AND-bridging fault occurring between signals a and signal b
x1 = 0 x2 = 0 x3 = 0 a = 1 b = 1 z = 0 fault z = 0
x1 = 0 x2 = 0 x3 = 1 a = 1 b = 0 z = 0 fault z = 1  This input vector can test
x1 = 0 x2 = 1 x3 = 0 a = 1 b = 0 z = 0 fault z = 1  This input vector can test
x1 = 0 x2 = 1 x3 = 1 a = 1 b = 0 z = 0 fault z = 1  This input vector can test
x1 = 1 x2 = 0 x3 = 0 a = 1 b = 1 z = 0 fault z = 0
x1 = 1 x2 = 0 x3 = 1 a = 1 b = 0 z = 0 fault z = 1  This input vector can test
x1 = 1 x2 = 1 x3 = 0 a = 0 b = 0 z = 1 fault z = 1
x1 = 1 x2 = 1 x3 = 1 a = 0 b = 0 z = 1 fault z = 1
Total number of test vectors = 4
```

f. Try to reason if there is any input vector that can test an “OR-bridging fault” occurring between signals a and signal b? If yes, find out all these test vectors as a table and report their total number.

ANS:

No, Total number = 0

```
OR-bridging fault occurring between signals a and signal b
x1 = 0 x2 = 0 x3 = 0 a = 1 b = 1 z = 0 fault z = 0
x1 = 0 x2 = 0 x3 = 1 a = 1 b = 0 z = 0 fault z = 0
x1 = 0 x2 = 1 x3 = 0 a = 1 b = 0 z = 0 fault z = 0
x1 = 0 x2 = 1 x3 = 1 a = 1 b = 0 z = 0 fault z = 0
x1 = 1 x2 = 0 x3 = 0 a = 1 b = 1 z = 0 fault z = 0
x1 = 1 x2 = 0 x3 = 1 a = 1 b = 0 z = 0 fault z = 0
x1 = 1 x2 = 1 x3 = 0 a = 0 b = 0 z = 1 fault z = 1
x1 = 1 x2 = 1 x3 = 1 a = 0 b = 0 z = 1 fault z = 1
Total number of test vectors = 0
```