Department of Electrical and Computer Engineering
Utah State University

ECE 5930/6930: VLSI Testing and Verification
Instructor: Dr. Roy

Homework 04
Solution Outline

Answer 1.

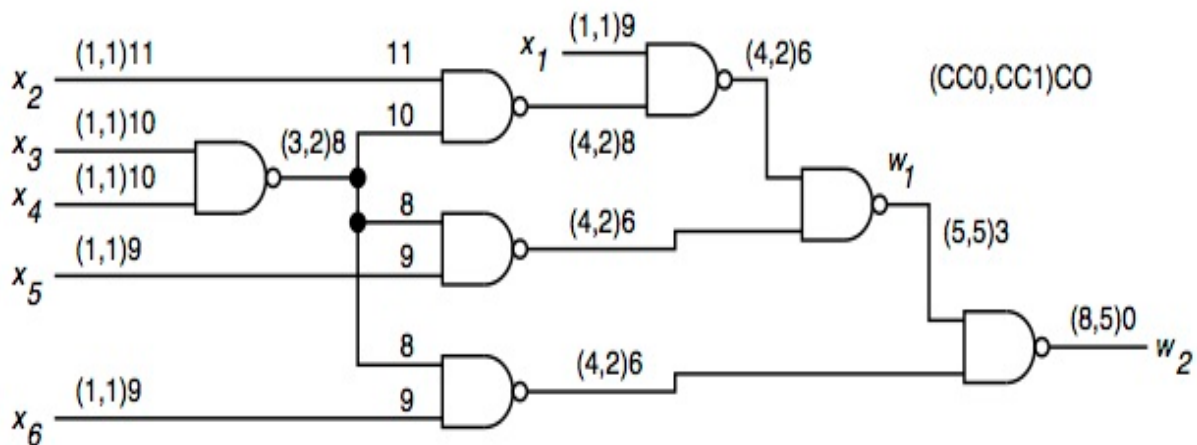The SCOAP values are shown in the Figure 1:

Figure 1: Combinational SCOAP Measures

Answer 2.
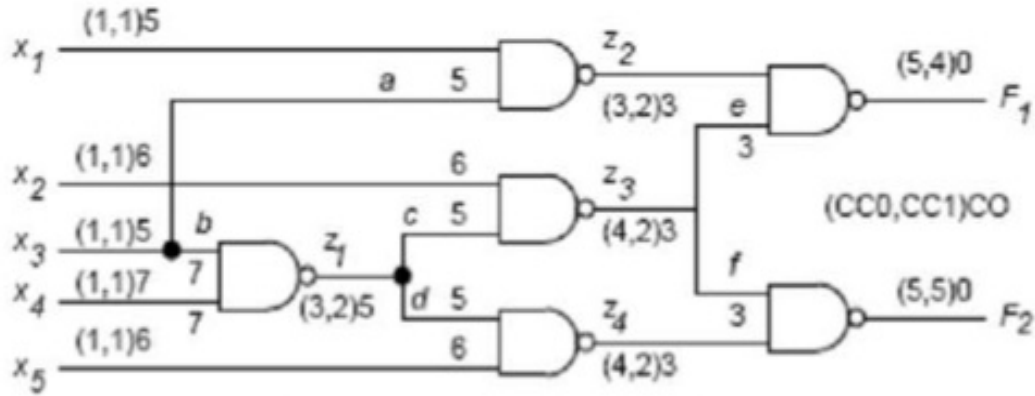
The SCOAP values are shown in the Figure 2:

Figure 2: Combinational SCOAP Measures

Answer 3.

The steps of calculation for SCOAP testability measures are shown in the three figures that follow. Combinational measures are shown as (CC0, CC1) CO and sequential measures as (SC0, SC1) SO.
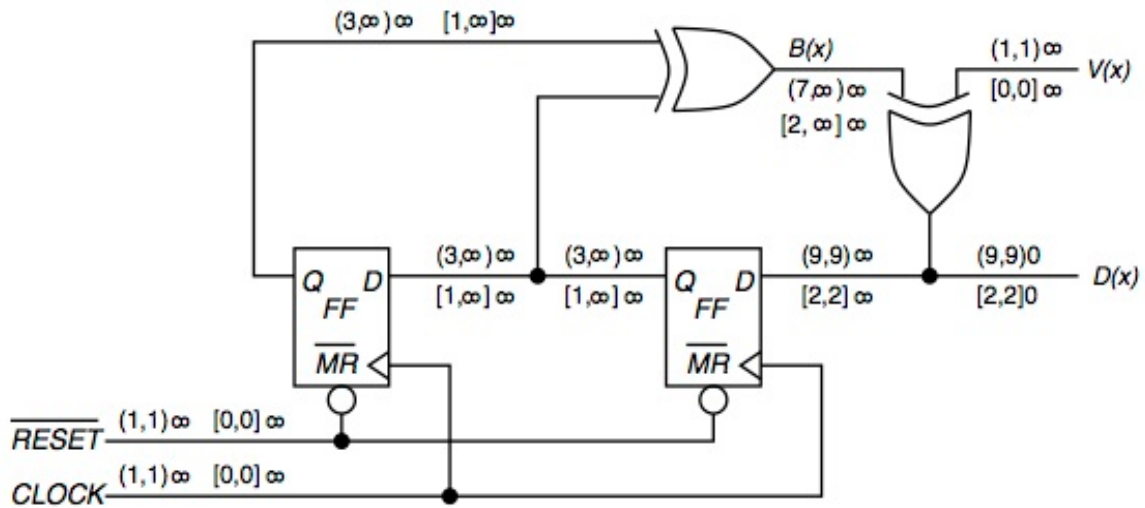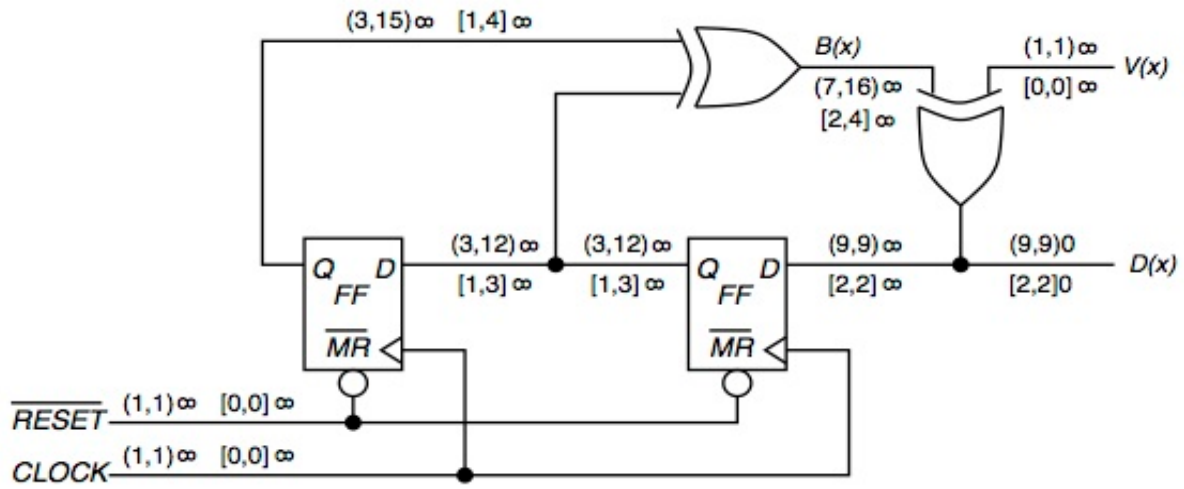

Figure 3: Initialization and First Controllability Pass

(3,15)∞   [1,4] ∞

B(x)
(7,16)∞
[2,4] ∞

(1,1)∞   V(x)
[0,0] ∞

(3,12)∞   (3,12)∞
[1,3] ∞   [1,3] ∞

(9,9)∞   (9,9)0   D(x)
[2,2] ∞   [2,2]0

Q D
FF
$\overline{MR}$

Q D
FF
$\overline{MR}$

$\overline{RESET}$ (1,1)∞   [0,0] ∞

CLOCK   (1,1)∞   [0,0] ∞

Figure 4: Converged Controllability Values

(3,15)6   [1,4]1

B(x)
(7,16)2
[2,4]0

(1,1)8   V(x)
[0,0]2

(3,12)9   (3,12)6
[1,3]2   [1,3]1

(9,9)9   (9,9)0   D(x)
[2,2]2   [2,2]0

Q D
FF
$\overline{MR}$ 21   5

Q D
FF
$\overline{MR}$ 21   5

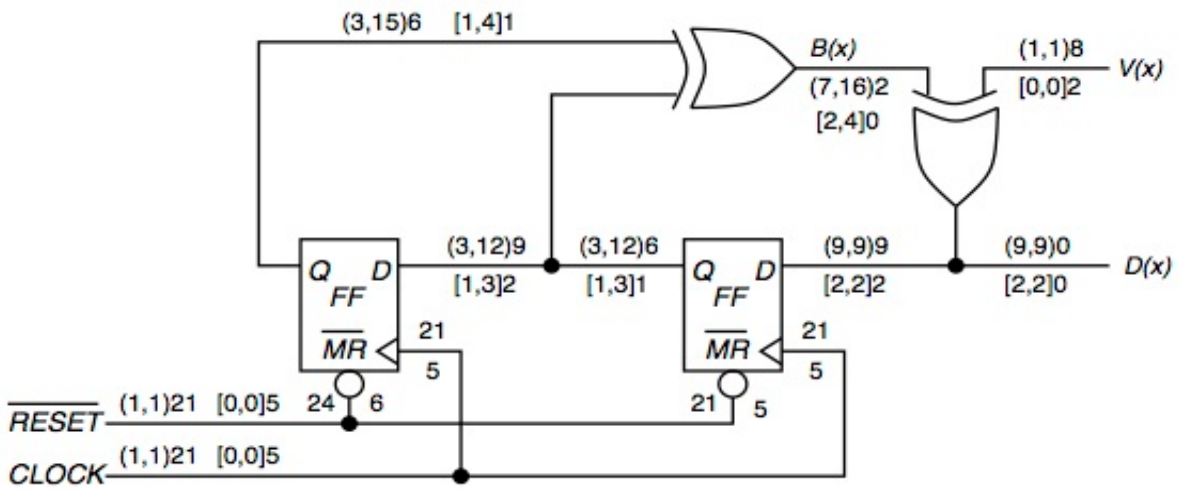$\overline{RESET}$ (1,1)21   [0,0]5   24   6

CLOCK   (1,1)21   [0,0]5

21   5

Figure 5: All Controllability and Observability Values