

This assignment covers material from the lectures and the text Chapters 4 and 7.

**Problem 1** (10 points) *Functional equivalence*

Text, Page 79, Problem 4.8.

**Problem 2** (10 points) *Initialization fault*

Text, Page 79, Problem 4.2.

**Problem 3** (15 points) *Fault collapsing*

Text, Page 80, Problem 4.11.

**Problem 4** (15 points) *Redundancy*

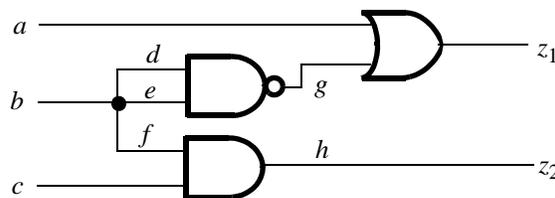


Fig. 1

- Identify all the redundant (undetected) SSL faults in the 3-input, 2-output circuit  $C$  in Fig. 1 above.
- List all the checkpoints of  $C$ .
- Find a complete set of tests  $T$  for all detectable checkpoint faults in  $C$  that does not detect all detectable faults in the circuit. Clearly identify the fault(s) that are not detected by  $T$ .
- What does this example imply about the book's Checkpoint Theorem on page 78?

**Problem 5** (20 points) *Fanout-free circuits*

Prove the following result discussed in class: All SSL faults in an  $n$ -input fanout-free circuit can be detected by at most  $n + 1$  test vectors.

Points will be deducted for a proof that is incomplete, unclear or very hard to follow.

**Problem 6** (10 points) *Combinational ATPG*

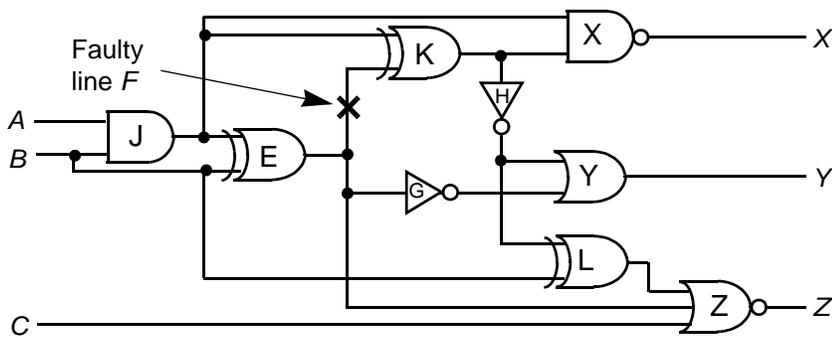


Fig. 2

Use Roth's DALG algorithm to generate a test for the stuck-at-1 fault on input line *F* of gate *K* in Fig. 2. Give your answer by carefully filling in a table like the one below. Include brief but clear comments to indicate the action associated with, or reason for, each step. The output signal of a gate should have the same name as the gate, e.g. gate *J* produces output signal *J*. (Do not rename signals or gates.)

Decision	Implications	Explanatory Comments

**Problem 7** (20 points) *DALG*

(a) Text, Page 207, Problem 7.4.

(b) Text, Page 207, Problem 7.5. This problem refers to the same line faulty line *h* used in part (a).

Give your answers using tables of the kind specified in Problem 6.

End of Problem Set No. 2 (7 problems, 100 points total)