

This assignment covers material from the lectures and the text Chapters 1, 3 and 4.

Problem 1 (15 points) *Defect level*

Text, Page 16, Problem 1.1. Also give your answer in parts per million (ppm).

Problem 2 (15 points) *Defect coverage*

Text, Page 16, Problem 1.2.

Problem 3 (15 points) *Testing cost*

Text, Page 16, Problem 1.4. Use the data from Example 1.2 (pages 10-11).

Problem 4 (15 points) *Benefit-cost analysis*

Text, Page 55, Problem 3.3. Please note a correction to the statement of this problem. Part (a) should read: Show that this scheme is beneficial for chips whose total cost is less than ten times the burn-in cost when the burn-in yield is 90%.

Problem 5 (10 points) *Fault counting*

Text, Page 79, Problem 4.4.

Problem 6 (15 points) *General fault analysis*

The following table shows the responses obtained when a set T of six tests is applied to a two-output combinational circuit C with any one of a set of eight faults F present.

		Faults F							
		f_0	f_1	f_2	f_3	f_4	f_5	f_6	f_7
Tests T	t_1	11	10	00	01	00	10	10	11
	t_2	11	01	00	01	00	01	01	00
	t_3	01	10	10	01	10	10	10	01
	t_4	10	11	01	10	01	11	01	10
	t_5	01	10	10	00	10	10	10	00
	t_6	11	10	10	00	10	10	00	00

- (a) How many equivalent fault classes does F contain with respect to T ?
- (b) Find a minimal set of tests from T that distinguishes every pair of distinguishable faults in F .
- (c) Let column f_0 denote the fault-free response of C to T . Find a minimum set of tests from T that detects all detectable faults in F .

Problem 7 (15 points) *Gate faults and tests*

- (a) Consider a 5-input NOR gate NOR5 with inputs x_1, x_2, x_3, x_4, x_5 and output z . How many detectable multiple stuck-at (MSL) faults does NOR5 have?
- (b) How many nonequivalent classes of faults exist among the MSL faults of NOR5?
- (c) Find a minimum set of tests for all MSL faults in NOR5.

End of Problem Set No. 1 (7 problems, 100 points total)