

**CSCI971 Advance Computer Security:  
Homework #4**

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## Problem 1

First, generate differential table for 3-bit Sbox 1 and 5-bit Sbox 2;

	0	1	2	3	4	5	6	7
0	8	0	0	0	0	0	0	0
1	0	2	0	2	0	2	0	2
2	0	0	2	2	0	0	2	2
3	0	2	2	0	0	2	2	0
4	0	0	0	0	2	2	2	2
5	0	2	0	2	2	0	2	0
6	0	0	2	2	2	2	0	0
7	0	2	2	0	2	0	0	2

Table 1: Differential distribution table for 3-bit Sbox

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
0	32	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
1	0	8	0	8	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
2	0	0	8	0	0	0	8	0	0	0	8	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
3	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
4	0	0	0	0	8	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	8	0	0	0	0	0	0	0	8	0	0	0	
5	0	4	0	4	0	0	0	0	0	0	0	0	0	4	0	4	0	4	0	4	0	0	0	0	0	0	0	0	0	4	0	4	
6	0	0	4	0	0	0	4	0	0	0	4	0	0	0	4	0	0	0	4	0	0	0	4	0	0	0	4	0	0	0	4	0	
7	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	
8	0	0	0	0	0	0	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	0	0	0	0	0	0	0	
9	0	0	0	0	0	0	0	0	4	0	0	4	4	0	0	4	0	0	0	0	0	0	0	0	4	0	0	4	4	0	0	4	
10	0	0	4	4	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	4	4	4	
11	0	4	4	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	4	4	0	0	
12	0	0	0	0	4	4	0	0	0	0	0	0	4	4	0	0	0	0	0	0	4	4	0	0	0	0	0	0	4	4	0	0	
13	0	0	0	0	4	0	0	4	4	0	0	4	0	0	0	0	0	0	0	0	4	0	0	4	4	0	0	4	0	0	0	0	
14	0	0	2	2	0	0	2	2	0	0	2	2	0	0	2	2	0	0	2	2	0	0	2	2	0	0	2	2	0	0	2	2	
15	0	2	2	0	0	2	2	0	0	2	2	0	0	2	2	0	0	2	2	0	0	2	2	0	0	2	2	0	0	2	2	0	
16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	8	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	4	4	4	4	4	0	0	0	0	0	0	0	0	
18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	0	0	0	0	4	4	4	4	0	0	0	0	4	4	
19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
20	0	0	0	0	4	0	4	0	0	0	0	0	4	0	4	0	0	0	0	0	0	4	0	4	0	0	0	0	0	4	0	4	
21	0	4	0	4	0	0	0	0	0	0	0	0	0	4	0	4	4	0	4	0	0	0	0	0	0	0	0	0	4	0	4	0	
22	0	0	4	0	4	0	0	0	0	0	4	0	4	0	0	0	0	0	4	0	4	0	0	0	0	0	0	4	0	4	0	0	
23	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0
24	0	0	0	0	0	0	0	4	4	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	4	4	0	0	0	0	
25	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	
26	0	0	0	0	0	0	0	0	4	4	0	0	0	0	4	4	4	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0	
27	0	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	0	
28	0	0	0	0	2	2	2	2	0	0	0	0	2	2	2	0	0	0	0	2	2	2	2	2	0	0	0	0	2	2	2	2	
29	0	0	0	0	2	2	2	2	2	2	2	2	0	0	0	0	0	0	0	2	2	2	2	2	2	2	2	2	0	0	0	0	
30	0	0	2	2	2	2	0	0	0	0	2	2	2	0	0	0	0	2	2	2	2	2	0	0	0	0	2	2	2	2	0	0	
31	0	2	2	0	2	0	0	2	2	0	0	2	0	2	2	0	2	0	0	2	0	2	2	0	0	2	2	0	2	0	0	2	

Table 2: Differential distribution table for 5-bit Sbox