University of Southern Queensland

Master of Cyber Security

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Security Network – CSC8520
Assignment 1

Question 1: Substitution Cipher.

Given a S-box:

	00	01	10	11
00	0011	1000	1111	0001
01	1010	0110	0101	1011
10	1110	1101	0100	0010
11	0111	0000	1001	1100

Task: Find the substitutions for the decimal numbers 12, 7, and 2.

1. **Number "12".**

Decimal 12 → Binary 1100 → split in two "Row 11" and "Column 00".

	00	01	10	11
00	0011	1000	1111	0001
01	1010	0110	0101	1011
10	1110	1101	0100	0010
11	0111	0000	1001	1100

The substitution for the decimal 12 is:
In decimal 7 → Binary 0111

2. **Number "7".**

Decimal 7 → Binary 0111 → split in two "Row 01" and "Column 11".

	00	01	10	11
00	0011	1000	1111	0001
01	1010	0110	0101	1011
10	1110	1101	0100	0010
11	0111	0000	1001	1100

The substitution for the decimal 7 is:
In decimal 11 → Binary 1011

3. Number "2".

Decimal 2 → Binary 0010 → split in two "Row 00" and "Column 10".

	00	01	10	11
00	0011	1000	1111	0001
01	1010	0110	0101	1011
10	1110	1101	0100	0010
11	0111	0000	1001	1100

The substitution for the decimal 2 is:
In decimal 15 → Binary 1111