CSS 322 – QUIZ 2C ANSWERS

First name: ______________________________ Last name: ___________________________

ID: _____________________________ Total Marks: ____________
out of 10

Question 1 [2 marks]

A block cipher must be reversible. Give an example of a block cipher that operates on 2-bit blocks that is:

a) Reversible

Answer

Of the 4 possible inputs plaintext, any output of ciphertext such that the ciphertext values are unique. E.g.

Plaintext	Ciphertext
00	10
01	11
10	01
11	00

b) Not reversible

Answer

The ciphertext are not unique.

Plaintext	Ciphertext
00	10
01	10
10	01
11	00

Question 2 [1.5 marks]

S-DES can be represented by the following equation:

$$Ciphertext = IP^{-1}\left(f_k\left(SW\left(f_{k_1}\left(IP\left(planitext\right)\right)\right)\right)\right)$$

Where f_{ki} is the round function, IP is the initial permutation and SW is swapping the halves.

Write a similar equation for the decryption in S-DES

Answer

$$Pla\,\mathrm{int}\,ex = IP^{-1}\left(f_{k\,_1}\left(SW\left(f_{k_2}\left(IP\left(Cipehrtext\right)\right)\right)\right)\right)$$

Question 2 [3 marks]

Indicate whether each statement is True or False (circle the correct answer):

a) A desirable property of an encryption algorithm is that small changes in key values produces large changes in the output ciphertext [✓ T] / F

b) DES is no longer recommended for use because the Feistel structure does not provide adequate security. T / [✓ F]

c) Galois field arithmetic is used in the AES Mix Column operation. [✓ T] / F

d) AES can use a larger block size than DES. [✓ T] / F

e) Because of the weaknesses of DES, AES does not use *rounds*. T / [✓ F]

f) 16 subkeys are generated for DES encryption – we must generate another 16 different subkeys for the corresponding DES decryption operation. T / [✓ F]

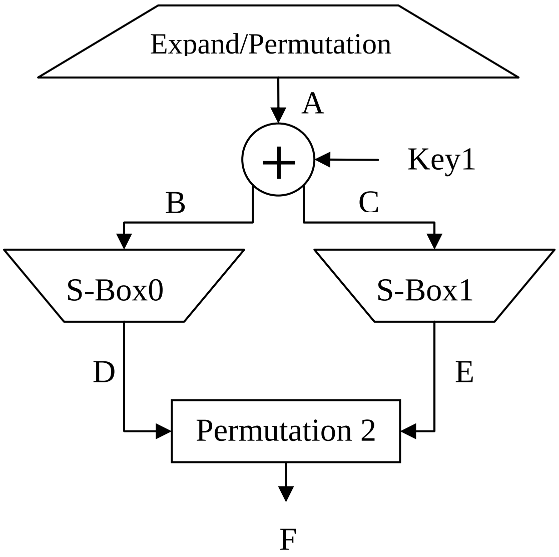
Question 4 [3.5 marks]

Calculate the values for B, C, D, E and F in the diagram for S-DES encryption below, where A = 11001010 and Key 1 = 01011000. You may use the information below the diagram.

Answer (B): __1001__________________ Answer (C): _0010__________________

Answer (D): __11____________________ Answer (E): __01____________________

Answer (F): __1101__________________



Expand/Permutation with 8 bit input, output bit order is: 4 1 2 3 2 3 4 1

Permutation 2, output bit order is: 2 4 3 1

S-Box 0 S-Box 1

$$S0 = \begin{bmatrix} 01 & 00 & 11 & 10 \\ 11 & 10 & 01 & 00 \\ 00 & 10 & 01 & 11 \\ 11 & 01 & 11 & 10 \end{bmatrix} \qquad S1 = \begin{bmatrix} 00 & 01 & 10 & 11 \\ 10 & 00 & 01 & 11 \\ 11 & 00 & 01 & 00 \\ 10 & 01 & 00 & 11 \end{bmatrix}$$