Assignment #2

No late assignments accepted!

ECE 487 (Data Communications Networks) **Section B1** Dr. Hai Jiang

Electrical and Computer Engineering, University of Alberta Winter 2020

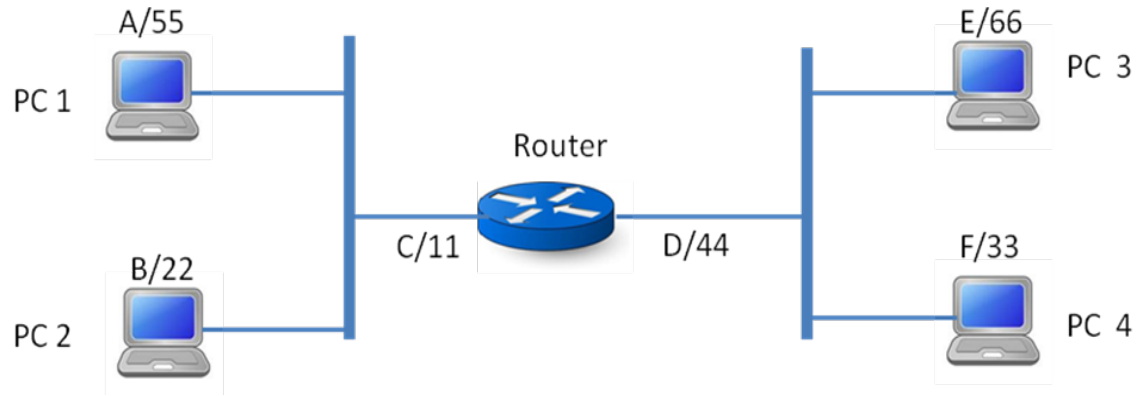
Your Last Name: _____ Your Fist Name: _____

Your Student ID: _____

Due: Thursday, January 23, 2020, 4:00 PM, in the assignment box at 2nd Floor - Pedway between ICE and ETLC

1. In the following figure, four PCs (with indices 1, 2, 3, and 4) are connected through two bus-topology local area networks (LANs). The address configuration is also shown in the figure, where a capital-case letter means an IP address and a number means a physical address. Any data frame in the network has the following format:

Assume a process with port address 'a' on PC 2 sends a message to a process with port address 'b' on PC 3. In the following table, please indicate the source & destination addresses used in the header of Layers 2, 3, and 4, for the data frame from PC 2 to the router and the data frame from the router to PC 3. (**6 points**)



	Data frame from PC 2 to the router		Data frame from the router to PC 3	
	Source address	Destination address	Source address	Destination address
Layer 2 header	22	11	44	66
Layer 3 header	B	E	B	E
Layer 4 header	a	b	a	b

2. What is the minimum Hamming distance for the following cases: i) detection of up to six bit errors; ii) correction of up to six bit errors? (**2 points**)

i) 7 ii) 13

3. How many bit errors can be detected and how many bit errors can be corrected if the minimum Hamming distance is i) 10; ii) 11? (**4 points**)

i) detect 9 and correct 4 ii) detect 10 and correct 5

4. Using the code In Table 10.2 on Slide 21 of Lecture 3, indicate the decoded dataword if one of the following codewords is received: a) 10101; b) 11010; c) 00011; d) 11011. Please show your steps. (**8 points**)

The following table shows the Hamming distance of the received codewords to the four valid codewords:

Received codewords are below	00000 (valid)	01011 (valid)	10101 (valid)	11110 (valid)	Decoded codeword	Decoded dataword
10101	3	4	**0**	3	10101	10
11010	3	2	4	**1**	11110	11
00011	2	**1**	3	4	01011	01
11011	4	**1**	3	2	01011	01