

COSC244 Tutorial
From Lecture 3 & 4

1. Distinguish between serial and parallel communications.
2. Distinguish between synchronous and asynchronous communications.
3. Why does asynchronous communication require additional start and stop bits?
4. Distinguish among simplex, half duplex and full duplex communications.
5. How does full duplex communication prevent signals traveling in opposite directions from colliding?
6. What is a multiplexer?
7. What is the primary motivation for using a multiplexer?
8. Distinguish between frequency division multiplexing and time division multiplexing.
9. What is a channel as applied to frequency division multiplexing?
10. What are guard bands?
11. Devise a Huffman code for letters whose frequency of occurrence is in the following table.

<u>Letter</u>	<u>Frequency</u>
A	15%
B	25%
C	20%
D	10%
E	10%
F	20%

12. What is the Huffman code's prefix property?
13. Compress the following bit stream using run-length encoding. Instead of using 4 bits as run-length, use 5 bits to code each run length. Parenthesized expressions indicate runs.

1 (31 zeroes) 1 (25 zeroes) 1 1 1 (44 zeroes) 1 (2 zeroes) 1 (45 zeroes)

Express the length of the compressed stream as a percentage of the original.

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14. The demonstrator will work through this question on the whiteboard.

The following LZW (Lempel-Ziv-Welch) algorithm was taken from Wikipedia and slightly modified.

```
Add all possible charcodes to the dictionary
w = "";
for (every character c in the incoming data) {
    if ((w + c) exists in the dictionary) {
        w = w + c;
    } else {
        add (w + c) to the dictionary;
        add the dictionary code for w to output;
        w = c;
    }
}
add the dictionary code for w to output;
display output;
```

Use it to compress the following string. The first statement loads the dictionary with the extended ASCII character set in positions 0-255. Ignore the spaces in the string; they are put in to make it more readable. A chart is attached for your assistance.

TOBEORNOTTOBEORTOBEORNOTTO

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w	c	w+c	output	Dictionary
				Initialized with extended ASCII code in 0-255
Nil	T			