Cairo University **Faculty of Computers and Artificial Intelligence**

Data Compression **Third year (2022-2023)**

(Fall 2022)

Sheet 2

Variable length coding

Question-1

Calculate the entropy of the following Stream of Alphabets (18 characters) , then apply Huffman Coding algorithm to compress them. Compare Huffman coding compression output (bits/symbol) with Entropy (neglect the overhead).

xxx yyy zzz xyz zyx xzy

Question-2

Apply Huffman coding on the following Characters (each character is originally stored in one byte):

abccbabaccab

- design Huffman table and huffman code for each symbol
- what is the length of the compressed file

Question-3

The modified Huffman encoder is applied to a data stream, the output of the encoder is
11100001100011011111100001010101111100111111110010011000111 0
and the Huffman code table is

Symbol	Code
I	01
S	1111
C	110
T	1110
R	10
Others	00

Others	code
H	01100011
L	10011001
O	11101110
U	11111111
E	01010101

Decode the output stream and get the original one.
What is the accurate compression ration achieved given that each original symbol consists of 8 bits and each table entry consists of 2 bytes ?,

Question-4

Compress the following stream of characters using Adaptive Huffman algorithm

A C D D C C C. Short codes of : A=00, C=10, D=11. (assign "1" to right branch and "0" to left branch of the tree). Highlight ALL Swap actions.

Question-5

Compress the following stream of alphabets:
abcccbba

- Using standard Huffman coding
- Using adaptive Huffman coding
- Comment on your results

Question-6

Decode the following stream of bits using Adaptive Huffman algorithm

SDSFFHS. Short codes of : S=00, D=10, F=11, H=01. (assign "1" to right branch and "0" to left branch of the tree