This tutorial covers problems on text compression (Module 10). There are 4 problems in total.

1. [E] Apply Huffman encoding on the string $s = $ CELESTEELA. Show the resulting decoding trie and give the encoding for s.

2. [E] Consider Run-Length Encoding compression.

a) Encode the string $s = $ 1111111100000111101111100000000000000000000 using RLE.

b) Decode the string $c = $ 111001011010010011 using RLE.

3. [M] For the following LZW problems, consider the initial dictionary to be the ASCII table.

a) Encode the following string using LZW: BANANA_BANDANA

b) Decode the following encoded string using LZW:

$$71 - 73 - 86 - 69 - 95 - 77 - 131 - 82 - 69 - 128 - 137 - 65 - 83$$

4. [M] For the following questions, you may assume that n is divisible by 4.

a) For each $n > 0$, give a string of n bits that achieves the worst compression ratio with Run-Length Encoding from all n-bit strings, and state the exact compression ratio achieved.

b) Same question, but for the best compression ratio.