1. 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:
      
      \[71 - 73 - 86 - 69 - 95 - 77 - 131 - 82 - 69 - 128 - 137 - 65 - 83\]

2. Suppose LZW starts adding new entries from the codeword \(2^k\) and the stops adding new entries after the codeword \(2^{m-1}\), so each codeword is \(m\) bits long. Give a combination of \(k\), \(m\), \(\Sigma\), and a source text \(S\), with \(|\Sigma| \leq 2^k\) and \(k < m\), such that the LZW encoding of \(S\) uses fewer total bits than the Huffman encoding of \(S\).


   a) Encode the following string using BWT: TORONTO
   b) Decode the following string using the inverse BWT: IPSSM$PISSII