CS 240: Data Structures and Data Management **Winter 2021**

Tutorial 11: April 12

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, Σ, 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.

3. Consider the Burrows-Wheeler Transform.

a) Encode the following string using BWT: `TORONTO`

b) Decode the following string using the inverse BWT: `IPSSM$PISSII`