1. With respect to the three-character alphabet \{\$, a, b\} (in which \$ is used strictly to signal end-of-string), indicate the sequence of nonnegative integers produced by applying the ZLW compression algorithm to the string

\[ ababaaabbbaa\$ \]

Show how this sequence would be encoded as a bit string, according to the compression algorithm. (Each integer in the sequence is encoded using the fewest number of bits necessary for encoding the largest number that could possibly occupy its position in the sequence, which is \(\lfloor \log k \rfloor\) bits, where \(k\) is the number of symbols in the dictionary up to that point of execution.

Assume that, initially, the dictionary (one possible representation of which is a digital search tree (or trie), as demonstrated in class) specifies that \$, a, and b are to be encoded as 0, 1, and 2, respectively.

Show the final contents of the dictionary (either as a trie or as a table).

2. Working under the scenario described in the previous problem (i.e., same alphabet, same initial dictionary), apply the ZLW decompression algorithm to the sequence

\[ 2 1 3 5 5 4 8 7 4 0 \]

in order to recover the original string of a’s, b’s, and \$’s.