Please formalize the pseudocode with comments for linear-time Z-value computation with detailed comments.

Please analyze the time complexity of your pseudocode.

Please list left, right, z-value, and which case for each position of the text S=“aabcaabxaaz”.

Lets say pattern = aab.

We know aab appears twice in the string but we need the algorithm to pinpoint those positions for us.

Lets combine the pattern with the text separated by a character that is non-existent in both strings, so lets choose, for instance, ‘$’

So the string we will process is a a b $ a a b c a a b x a a z

Using the z-algorithm, we will try to find the longest substring starting at the kth position which is also the prefix of the string

Initially:

Z is an array of size n, where n is the size of the string to be processed

Left and right pointers (we’ll call them left and right) start at 0

Left a

We start at 1 because the longest substring at index 0 because we have no prefix beforehand to make any comparisons, so starting at index 1, we can look behind and compare

For every k from 1 to n-1:

When k == 1:

Func process(string):

# text is the string to be searched and pattern is what string to search for

Func getPatternPositions(text, pattern):

# where ‘$’ is a string that doesn’t exist in both pattern and text

CombinedStr = pattern + ‘$’ + text

returnList = empty list

preprocessed = process(CombinedStr)

let n = size of preprocessed

for every i from 0 to n – 1:

if the value at position i in preprocessed has the same length as that of pattern:

append this value to the returnList

return returnList