**WEEK 1: Practice Quiz – Tries & Suffix Trees**

**40% on first attempt**

1. O(|Patterns|) for a trie that is built off non-empty patterns. That would be equal to **O(n L)**, since all patterns has a length greater than L.

Although each pattern can have length up to L, and there are n patterns, you are guaranteed that the total length of all patterns is S, and O(S) is thus a tighter estimate on the memory consumption.

1. What is the time complexity of searching all occurences of patterns in text T of length |T| if all patterns have length at most and the sum of their lengths is at most ?

Searching for all occurrences will take time.

Remember that you need to find occurences everywhere in the text T, and you need to try finding an occurrence starting at each of the T positions in the text T. Hence running time would be O(|T| |L|), since you don’t have to traverse the entire text for a given pattern.

1. What is the smallest possible number of nodes in a trie built of patterns if all patterns have the same length?

If all patterns are of length L, then the smallest possible number of nodes would be nL.

Consider the case when all the patterns are the same. The smallest possible number of nodes would be L+1.

1. If you take all the suffixes of a string S of length L and build a regular trie of those suffixes as patterns, what is the maximum possible number of nodes in such trie?

It would be L(L+1)/2 + 1 (root).

Indeed if all the characters in S are different, all the suffixes will start with different characters, so each of them will require a WHOLE SEPARATE branch in the trie. The longest suffix will generate a branch of length L, and the next one will generate a branch of length L-1, and the following one L-2. The total number of nodes would be the sum of an arithmetic progression: L(L+1)/2. + the root node.

1. What is the smallest possible number of nodes in a suffix tree of string S with length L?

L+1

Correct! If the string S is aaa….aaaa – consists of many repeated letters, then all the suffixes of this string will be aaa…aaa. So they will all fit into the single branch of the suffix tree, and this branch will contain the root node and L more nodes for the longest suffix of the string S.