1. Create a trie for the set of words $S = \{ab, ba, ca, caa, caaa, baa\}$ over the alphabet $\Sigma = \{a, b, c\}$.

2. Consider a text $B$, and the suffix tree $T$ for $B$. Show that a word $w$ appears as a substring in $B$ if and only if there is a path in $T$ from the root to some nodes, and this path corresponds to $w$.

3. Create a suffix tree for the text $B = \{abaabaaab\}$ over the alphabet $\Sigma = \{a, b\}$.

4. How would you change the structure of the trie, so that you can perform the following operations on this trie:
   (a) Given a set $S = \{w_1 \ldots w_n\}$ of words, construct the trie for $S$ in time $O(\Sigma_{i=1}^n |w_i|)$.
   (b) Given a word $w$ (not necessarily of $S$), find how many words in $S$ have $w$ as a prefix. You should be able to answer this query in time $O(|w|)$.

5. Given a text $B$ of $n$ characters, suggest a modification of the suffix tree data structure for $B$, such that the following query operation could be performed. Given a query word $w$, report how many times $w$ appears (as a contiguous substring in $B$). For example

   $B = "ccaaaabaaa"

   then the query word $w = "c"$ appears twice in $B$, the query word $w = "cc"$ appears once, and $w = "aaa"$ appears 3 times.

   $B = "ccaaaabaaa", "ccaaabaa", "ccaaabaa"$

   The preprocessing time (the time for creating the structure) is $O(n^2)$, and the space required after for storing the data structure is $O(n)$.

6. Let $k, n$ be given parameters, where $n = 2^i$ for some integer $i$. Suggest a set of words $S = \{w_1, \ldots, w_n\}$ over an alphabet $\Sigma = \{a, b\}$, where $|w_i| \leq k$, such that the number of nodes in a trie storing $S$ is as large as possible. What is this number?