Mandatory Exercise: Suffix Trees

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1 String Dictionaries with ? Let $S = s_1 s_2 \cdots s_n$ be a string of length n over an alphabet Σ. We are interested in a data structure for S that supports the following query.

- search?(P_1, P_2): return the starting position of all occurrences of $P_1 ? P_2$ in S. Here $P_1 ? P_2$ denotes the string P_1 followed by any character (denoted by the ?) followed in turn by the string P_2.

Give a data structure that supports search?(P_1, P_2) queries efficiently. Your space should be $O(n \log n)$. Your query time should be output sensitive, i.e., achieve a bound of the form $m + f(n) + \text{occ}$, where $m = |P_1| + 1 + |P_2|$, occ is the length of the returned sequence and $f(n)$ is a small function of n.