Exercises

• Study KMP Algorithm for String Matching

• Extend Rabin-Karp method to the problem of searching a text string for an occurrence of any one of a given set of $k$ patterns? Start by assuming that all $k$ patterns have the same length. Then generalize your solution to allow the patterns to have different lengths.

• Let $P$ be set of $n$ points in the plane. We define the depth of a point in $P$ as the number of convex hulls that need to be peeled (removed) for $p$ to become a vertex of the convex hull. Design an $O(n^2)$ algorithm to find the depths of all points in $P$.

• The input is two strings of characters $A = a_1, a_2, ..., a_n$ and $B = b_1, b_2, ..., b_n$. Design an $O(n)$ time algorithm to determine whether $B$ is a cyclic shift of $A$. In other words, the algorithm should determine whether there exists an index $k$, $1 \leq k \leq n$ such that $a_i = b(k+i) \mod n$, for all $i$, $1 \leq i \leq n$. 