1. String matching: an example

(a) Build a finite automata to search for the string “bababoon”.

(b) Use the automata from part (a) to build the prefix function for Knuth-Morris-Pratt.

(c) Use the automata or the prefix function to search for “bababoon” in the string “babybaboon-buysbananasforotherbabybababoons”.

2. Cooking Schedule Strikes Back

You live in a cooperative apartment with \( n \) other people. The co-op needs to schedule cooks for the next \( 5n \) days, so that each person cooks five days and each day there is one cook. In addition, each member of the co-op has a list of days they are available to cook (and is unavailable to cook on the other days).

Because of your success at headbanging last week, the co-op again asks you to compose a cooking schedule. Unfortunately, you realize that no such schedule is possible. Give a schedule for the cooking so that no one has to cook on more than 2 days that they claim to be unavailable.

3. String matching on Trees

You are given a rooted tree \( T \) (not necessarily binary), in which each node has a character. You are also given a pattern \( P = p_1p_2\cdots p_l \). Search for the string as a subtree. In other words, search for a subtree in which \( p_i \) is on a child of the node containing \( p_{i-1} \) for each \( 2 \leq i \leq l \).