Mathematical Methods in Linguistics

Exercise 1.

Write a negative grammar G_1 with alphabet $\{a,b,c\}$ such that L(G) contains all strings that start and end with an a. Then write a another grammar G_2 over the same alphabet that only generates strings where each a is immediately followed by a b. After that, write another grammar G_3 over the same alphabet that requires b to only occur in clusters of the form bba. So a string like aaaabbaaabba is well-formed, but aaaaba or bb is not. Finally, construct a combined grammar $G_{1,2,3}$. What is the language generated by this grammar?

Exercise 2.

Continuing the previous exercise, fill in the cells in the table below with Y or N depending on whether the grammar generates the string. The first row has already been completed as an example.

G_1 C	G_2 G	$G_3 G_{1,2,3}$
Y I	N Y	Y N