Consider the following syntax diagram. The symbols $a, b$ are terminal symbols of some grammar, and the symbols $v_0, v_1$ are nonterminal symbols of the same grammar.

1. Give the BNF representation for the syntax diagrams above. You may provide nonterminal symbols as needed (in addition to $v_0, v_1$), to use in the BNF productions. You may use several BNF statements if needed.

$$
\langle v_0 \rangle ::= b \mid b \langle v_0 \rangle \mid a \langle v_1 \rangle \\
\langle v_1 \rangle ::= b \langle v_1 \rangle \mid a \mid a \langle v_0 \rangle
$$

2. (Bonus question) Combine the two syntax diagrams above into one master diagram representing $v_0$ (i.e. a diagram which involves only terminal symbols). Pay careful attention to how the recursion should work.