

Consider the grammar  $(N, T, P, \sigma)$  given as defined below.

$$N = \{ \langle s \rangle \}$$

$$T = \{ A, B, C, \dots, Z, \wedge, \vee, ! \}$$

$$P = \left\{ \begin{array}{l} \langle s \rangle \rightarrow \langle s \rangle \wedge \langle s \rangle \\ \langle s \rangle \rightarrow \langle s \rangle \vee \langle s \rangle \\ \langle s \rangle \rightarrow ! \langle s \rangle \\ \langle s \rangle \rightarrow A|B|C| \dots |Y|Z \end{array} \right\}$$

$$\sigma = \langle s \rangle$$

1a) How many valid words are in the language this grammar defines?

1b) Show that " $A \wedge B \vee ! C$ " is in this language by providing a derivation.

2) Write a grammar that generates the strings over  $\{a, b, c\}$  that end in  $abcba$ .