4.2. Find a context-free grammar corresponding to the “syntax diagram” in Figure 4.32.

4.3. In each case below, find a CFG generating the given language.
   (a) The set of odd-length strings in \(\{a, b\}^*\) with middle symbol \(a\).
   (b) The set of even-length strings in \(\{a, b\}^*\) with the two middle symbols equal.
   (c) The set of odd-length strings in \(\{a, b\}^*\) whose first, middle, and last symbols are all the same.

4.4. In both parts below, the productions in a CFG \(G\) are given. In each part, show first that for every string \(x \in L(G)\), \(n_a(x) = n_b(x)\); then find a string \(x \in \{a, b\}^*\) with \(n_a(x) = n_b(x)\) that is not in \(L(G)\).
   (a) \(S \rightarrow SaS \mid SbaS \mid \Lambda\)
   (b) \(S \rightarrow aSb \mid bSa \mid abS \mid baS \mid Sab \mid Sba \mid \Lambda\)

(Figure 4.32)