1. For each of the following languages, indicate whether the language is context-free (C) or not (N).

(a) \( L = \{ w : n_a(w) = n_b(w) \} \)
(b) \( L = \{ a^n b^j a^j b^n : n \geq 0, j > 0 \} \)
(c) \( L = \{ a^n b^j a^k b^l : n + j \leq k + l \} \)
(d) \( L = \{ a^n b^j a^m b^m : n, m \geq 0 \} \)
(e) \( L = \{ a^n b^n c^m : n \neq m \} \)
(f) \( L = \{ w : n_a(w) < n_b(w) < n_c(w) \} \)
(g) \( L = \{ a^n b^j a^n b^j : n, j \geq 0 \} \)
(h) \( L = \{ a^n b^n c^j : n \leq j \} \)

2. For each of the above languages that ARE context-free, describe how an npda would use the stack to recognize the language.

3. Given the npda \( M = (\{ q_0, q_1, q_2 \}, \{ a, b \}, \{ A, z \}, \delta, q_0, z, \{ q_2 \}) \), where \( \delta \) is:
   \[
   \begin{align*}
   \delta(q_0, a, z) &= \{(q_0, Az)\} \\
   \delta(q_0, a, A) &= \{(q_0, A)\} \\
   \delta(q_0, b, A) &= \{(q_1, \lambda)\} \\
   \delta(q_1, \lambda, z) &= \{(q_2, \lambda)\}
   \end{align*}
   \]

   What is the language \( L(M) \)?