Homework 7

Problem (Pumping Lemma for Context-Free Languages). Show that the following languages are not context-free.

(a) $L = \{a^n : n \geq 0\}$
(b) $L = \{a^{3n}b^n : n \geq 0\}$
(c) $L = \{a^n b^j c^k : k = 3jn \text{ and } k,j,n \geq 0\}$
(d) $L = \{w \in \{a,b,c\}^* : n_a(w) + n_b(w) = 2n_c(w)\}$