1. 3.5.1.(a)

   By closure under concatenation, $L_1 = \{a^m b^n : m > n\} = \{a^n : n > 0\} \circ \{a^n b^n\}$ and $L_2 = \{a^m b^n : m < n\}$ are context-free languages. So by closure under union, $L_1 \cup L_2 = \{a^m b^n : m \neq n\}$ is context-free.

2. Question 2

   Show $L = \{wcwcw : w \in \{a, b\}^*\}$ is not context-free. It's sufficient to show $L' = L \cap a^*ca^*ca^* = a^n ca^n ca^n$ is not context free.

   Let $n \in \mathbb{N}$, let $w = a^n ca^n ca^n = uvxyz$, if v or y has c in it, then $uv^2xy^2z \notin L'$. If neither v nor y has c in it, then $uv^2xy^2z = a^m ca^p ca^q$, where one of m, p, q equals n, and the other two are equal but not equal to n, which means $uv^2xy^2z \notin L'$.

3. Question 3

$$\begin{aligned}&\{a^m ba^n ba^p : m = n \vee n = p \vee m = p\}\\ =&\{a^n ba^n ba^*\} \cup \{a^* ba^n ba^n\} \cup \{a^n ba^* ba^n\}\end{aligned}$$

   All three languages are context-free.