1. 2.3.7.(b)

$$((a \cup b)(a \cup b))^*$$

2. As the hint suggests, by regularity's closure under intersection, it suffices to show $L \cap a^*bba^* = \{a^n bba^n : n \geq 0\}$ is non-regular. Take arbitrary $N > 0$. Let $w = a^N bba^N$. Take arbitrary $xyz = w$, with $|xy| \leq N$, $y \neq \epsilon$. Note that $x = a^h, y = a^i, z = a^j bba^N$, where $h \geq 0, i > 0, j \geq 0$ and $h + i + j = N$. Let $k = 2$, then $x(y^k)z = a^h a^{2i} a^j bba^N = a^{N+i} bba^N \notin L$.

   Note: we actually have a stronger conclusion in this case that $w$ can be arbitrary and $k > 0$ is sufficient, since any repetition has to be done both before and after $bb$, and repetition of $y$ can only appear before or after $bb$ (or containing $bb$).

3. $$L = (a \cup b)^*, S = a^n b^n$$