Give Regular Expression for the following languages

1. \( L_1 = \{vwv | v, w \in \{a, b\}^* \text{ and } |v| = 2 \} \)

2. \( L_2: \) all strings \( w \in \Sigma^* = \{0, 1\}^* \) with an even number of 1’s; that is \( n_1(w) = 0 \mod 2 \)

3. \( L_3: \) all strings of \( \Sigma = \{0, 1\} \) containing 11 but not ending in 11

4. \( L_4: \) all strings \( w \in \Sigma^* = \{a, b\}^* \) where either \( n_a(w) = 3 \) or \( n_a(w) = 0 \mod 2 \). That is the number of a’s in \( w \) is three or even

5. \( L_5: \) all strings over \( \Sigma = \{0, 1\} \) which contain at least one occurrence of 00 but not 000 or 0000 etc. That is you can have at most 2 paired 0’s and you have to have at least one such pair. Note: this is the same language as Hwk Asgt #4 1.d.