1.46 Prove that the following languages are not regular. You may use the pumping lemma and the closure properties of the class of regular languages under union, intersection and complement.

b) \( L = \{0^m1^n | m \neq n \} \)

d) \( L = \{wtw | w, t \in \{0,1\}^* \} \)

- Show that \( L = \{01^n1^n | n \geq 0 \} \) is not regular.

- TRUE or FALSE

1. If \( L_1 \cup L_2 \) is regular and \( L_1 \) is regular, then \( L_2 \) is regular.
2. If \( L_1 \) is regular and \( L_2 \subseteq L_1 \), then \( L_2 \) is regular.
3. If \( L_1 \) is regular and \( L_2 \) is not regular, then \( L_1 \cup L_2 \) is not regular.
4. If \( L_1 \) is regular and \( L_1 \cup L_2 \) is not regular, then \( L_2 \) is not regular.
5. If \( L_1 \) is regular and \( L_2 \) is not regular, then \( L_1 \cap L_2 \) is not regular.
6. If \( L_1 \) is not regular and \( L_2 \) is not regular, then \( L_1 \cup L_2 \) is not regular.

- Prove that regular languages are not closed under infinite union.