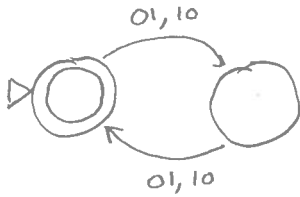


1.

a) $(aa)^*$

b)



c) For any substring of strings in the language, the pumping lemma can be disproven.

For example:

00100100 is in the language, but any pumped substring other than the one highlighted will disprove the pumping lemma.

$$2. L = \{(ab)^n a^k (ba)^n \mid k < 3\}$$

word: abababababababababab
computer chose

pumped: $(ab)^4 a (ab)^6 a (ab)^4 a$

$$L = \{w \in \Sigma^* \mid |w| \text{ is odd and the middle symbol is } a\}$$

word: bbbbbbbabbbbbbb
computer chose

pumped: $b^8 a b^{15}$

3. Created PDA for $L = \{w \in \Sigma^* \mid |w| \text{ is odd and the middle symbol is } a\}$.

4. ✓

5. ✓