1. **Regular languages (10 points).** Show that the following language \( L \) over the alphabet \( \Sigma = \{0, 1\} \) is regular: \( L = \{ w \mid w \text{ contains the substring 11010} \} \).

2. **Closure (15 points).** Let \( A \) and \( B \) be regular languages over some finite alphabet \( \Sigma \). Prove that the language \( L = A \cap B \) is regular.

3. **Closure (15 points).** Let \( A \) and \( B \) be regular languages over some finite alphabet \( \Sigma \). Prove that the language \( L = \{ w \mid w \in A \text{ and } w \notin B \} \) is regular.

4. **Closure (20 points).** Let \( A \) be a regular language over some finite alphabet \( \Sigma \). Prove that the language \( L = \{ w \mid w \in A \text{ and } wx \notin A \text{ for all } x \in \Sigma^* - \{\epsilon\} \} \) is regular.

5. **Closure (20 points).** Let \( A \) and \( B \) be regular languages over some finite alphabet \( \Sigma \). Prove that the language \( L = \{ w \mid w \in \Sigma^* \text{ and } wx \in A \text{ for some } x \in B \} \) is regular.

6. **Closure (20 points).** Let \( A \) be a regular language over some finite alphabet \( \Sigma \). Prove that the language \( L = \{ w^R \mid w \in A \} \) is regular.