Assignment 12

Due date: Week 14

Instructions:

1. Describe the state graph of the following automaton:
   ![State Graph]

2. Prove that if machine M accepts P(S) containing a string in P(S) that machine M contains a cycle.

3. Construct a regular expression for the following automaton:
   ![Automaton]

4. Explain the differences between deterministic and non-deterministic automata.

5. Prove that if a regular language L contains a string containing the empty word, then L is not a regular language.

6. Design an automaton that accepts the language of all strings over {a, b} where the number of a's is even.

7. Explain the concept of nondeterminism in automata theory.

8. Discuss the significance of automata in computer science.

9. Provide an example of a language that is not regular.

10. Prove that if a language L is regular, then its complement is also regular.

11. Explain the concept of closure properties of regular languages.

12. Construct a finite automaton for the following regular expression:
   ![Regular Expression]

13. Prove that if a language L is regular, then the language of all strings that come before a string in L is also regular.

14. Discuss the importance of automata in the design of compilers.