## 25 Lecture - CS402

### **Important Subjective**

#### 1. Define what is meant by a nonregular language.

Answer: A nonregular language is a language that cannot be described by a regular expression or recognized by a finite automaton.

#### What is the pumping lemma for regular languages?

Answer: The pumping lemma for regular languages states that every regular language has a pumping length, such that any string longer than the pumping length can be divided into three parts: u, v, and w. For any integer i ? 0, the string uv^iw is also in the language.

#### Explain the difference between a regular language and a context-free language.

Answer: A regular language can be recognized by a finite automaton, while a context-free language can be recognized by a pushdown automaton.

#### Give an example of a nonregular language.

Answer: An example of a nonregular language is the language of all palindromes over the alphabet {a, b}, where the number of a's and b's is equal.

#### What is the Myhill-Nerode theorem?

Answer: The Myhill-Nerode theorem is a theorem in formal language theory that states that a language is regular if and only if it has a finite number of equivalence classes under the right-invariant and left-invariant relations defined by the language.

# What is the difference between a deterministic finite automaton (DFA) and a nondeterministic finite automaton (NFA)?

Answer: A deterministic finite automaton has exactly one transition for each input symbol and current state, while a nondeterministic finite automaton may have multiple transitions for the same input symbol and current state.

#### Can a nonregular language be context-free?

Answer: Yes, a nonregular language can be context-free.

#### What is the closure property of regular languages?

Answer: The closure property of regular languages states that the union, concatenation, and Kleene star of regular languages are also regular.

#### Give an example of a language that is not regular.

Answer: An example of a language that is not regular is the language of all strings of the form 0^n1^n2^n, where n is a nonnegative integer.

#### How can the pumping lemma be used to prove that a language is not regular?

Answer: The pumping lemma can be used to prove that a language is not regular by assuming that the language is regular, choosing a string that is longer than the pumping length, and showing that the string cannot be pumped. This contradicts the assumption that the language is

