38 Lecture - CS402

Important Subjective

1. **What is a nondeterministic pushdown automaton (NPDA)?**
   Answer: A theoretical model of computation that extends the capabilities of a deterministic pushdown automaton (DPDA) by allowing multiple possible transitions from a given state on the same input symbol.

   What is the primary difference between a DPDA and an NPDA?
   Answer: The primary difference is that an NPDA can have multiple possible transitions from a given state on the same input symbol, while a DPDA can only have one.

   What is a valid component of an NPDA?
   Answer: A 5-tuple consisting of a set of states, an input alphabet, a stack alphabet, a transition function, and a set of accepting states.

   Can an NPDA have multiple start states?
   Answer: No, an NPDA can only have one start state.

   What does it mean for an NPDA to accept an input string?
   Answer: It means that there exists at least one valid path through the machine's states and stack that leads to an empty stack at the end of the input.

   Can an NPDA accept an input string with an invalid path?
   Answer: No, an NPDA can only accept an input string if there exists at least one valid path through the machine's states and stack.

   What is a nondeterministic choice in an NPDA?
   Answer: A nondeterministic choice is when the machine has multiple possible transitions from a given state on the same input symbol, and it chooses one of them nondeterministically.

   What is a computation tree in an NPDA?
   Answer: A tree-like representation of the possible paths the machine can take through its states and stack on a given input string.

   What is the time complexity of an NPDA?
   Answer: It can be either exponential or polynomial, depending on the specific machine and input.

   Can an NPDA recognize a language that is not context-free?
   Answer: No, an NPDA can only recognize context-free languages.