Peter Chinetti

CS 440 Exam 2

1 LL Grammars

- Common Prefix and Left Recursion.
- Eliminate Left Recursion:
  - Productions of the form $S \to \beta$ become $S \to \beta S'$
  - Productions of the form $S \to S\alpha$ become $S' \to \alpha S'$
  - Add $S \to \epsilon$
- Eliminate Mutual Recursion:
  - Take the first Symbol and eliminate left recursion
  - Take the second symbol and substitue left recursions of A, then eliminate left recursions of B
  - Take the third symbol and substitute left recursions of A and B, then eliminate left recursions of C
  - ...
- Got it.

2 Prolog

- Prolog operators can only return true or false, and operate via unification with backtracking.

```
sum([],0).
sum([H|T],X) :- sum(T,Y), X is Y + H.

append([],X,X)
append([H|T],X,[H|Z]) :- append(T,X,Z)
```

```
flatten([],[]).
flatten([H|A],[H|A]) :- flatten(A,B).
flatten([L|A],Z) :- is_list(L), !, append(L,A,X), flatten(X,Z).

isprefix([],X)
isprefix([H|T],[H|Z]) :- isprefix(T,Z)
```

- All queries in Prolog are attempted to be solved via unification.

3 Prolog Cut

- The cut operator stops backtracking.
- Got it.
- Got it.

4 Unification

- Got it.
- Haskell's type checker, prolog.

5 Grammars

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- An ambiguous grammar is a grammar which an parse an input into two or more trees.

6 Operational Semantics

- Got it.
- Given an expression with two different evaluation paths, both paths will evaluate to the same value.