Omar Ahmadi Section 05

CS314 Assignment 2

Problem 1

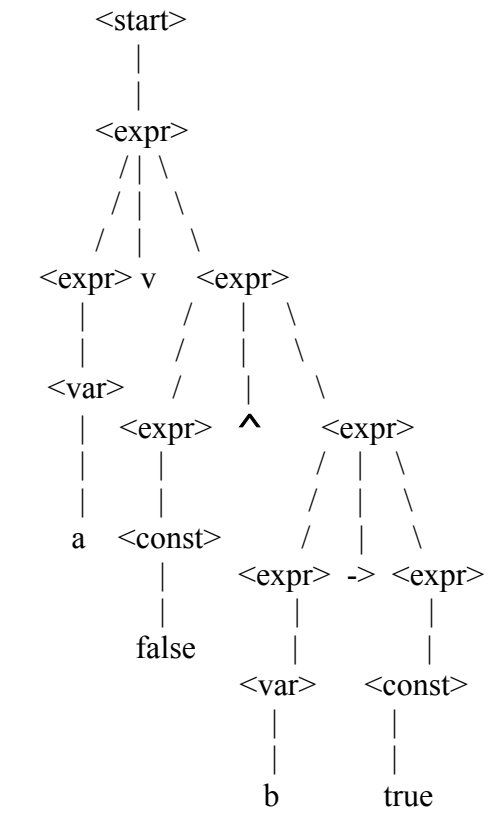
1. { $a^n b^m c^o$ | m > n ≥ 0, o > 0 } , with alphabet Σ = {a. b, c}
   < S > ::= < A >< B >< C >
   < A > ::= a < A > b | ϵ
   < B > ::= b < B > | b
   < C > ::= c < C > | c
2. { $a^n b^{2n}$ | n ≥ 0 } , with alphabet Σ = {a. b}
   < S > ::= a < S > bb | ϵ
3. { ww^R | w ϵ Σ* and w^R is w ub reverse }, with alphabet Σ = {a, b}
   < S > ::= a < S > a | B < S > b | ϵ
4. { $a^n b^m c^m d^n$ | n ≥ 0, m ≥ 0 }, with alphabet Σ = {a, b, c, d}
   < S > ::= a < S > d | < A > | ϵ
   < A > ::= b < A > c | ϵ
5. { w | w has no more than 4 symbols, with alphabet Σ = {a, b}
   < S > ::= < A >< A >< A >< A >
   < A > ::= a | b | ϵ

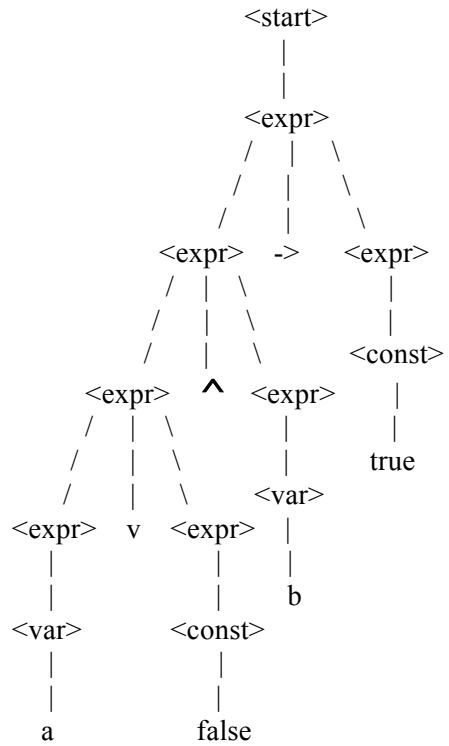
Problem 2

1. <start>
   → LM <expr>
   → LM <expr> V <expr>
   → LM <var> V <expr>
   → LM a V <expr>
   → LM a V <expr> V <expr>
   → LM a V <const> V <expr>
   → LM a V false V <expr>
   → LM a V false V <expr> → <expr>
   → LM a V false V <var> → <expr>
   → LM a V false V b → <expr>
   → LM a V false V b → <const>
   → LM a V false V b → true

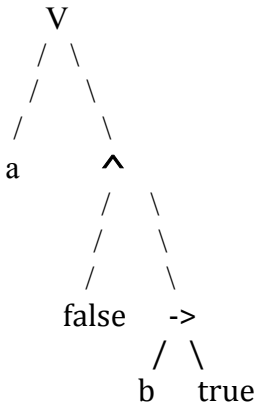
   <start>
   → RM <expr>
   → RM <expr> → <expr>
   → RM <expr> → <const>
   → RM <expr> → true
   → RM <expr> V <expr> → true
   → RM <expr> V <var> → true
   → RM <expr> V b → true
   → RM <expr> V <expr> V b → true
   → RM <expr> V <const> V b → true
   → RM <expr> V false V b → true
   → RM <var> V false V b → true
   → RM a V false V b → true

2. Parse Trees





3. Abstract syntax trees



4. The sentence A V false ^ → true has multiple possible parse trees the grammar is ambiguous.