CSC 345 Lab – Grammar

Overview

In this lab you will show string derivations for a given grammar. You will also write a grammar when given a language description.

Problem 1

Derive the string aaa.

G = (N, T, P, S)
- N = { S }
- T = { a }
- P = { S → Sa,
    S → ε
    }
- S = { S }

Problem 2

Derive the string 8+5. Use a left-most derivation.

G = (N, T, P, S)
- N = { E, S, T, V }, T = { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, +, * }, S = { E }
- P = { E → S,
    S → T + S,
    S → T,
    T → V * T,
    T → V,
    V → 0, V → 1, V → 2, V → 3, V → 4, V → 5, V → 6, V → 7, V → 8, V→9 }
    }

Problem 3

Derive the string 8+5. Use a right-most derivation.

G = (N, T, P, S)
- N = { E, S, T, V }, T = { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, +, * }, S = { E }
- P = { E → S,
    S → T + S,
    S → T,
    T → V * T,
    T → V,

V → 0, V → 1, V → 2, V → 3, V → 4, V → 5, V → 6, V → 7, V → 8, V→9 }
}

Problem 4

Derive the string 3+4*6. Use a left-most derivation.

G = (N, T, P, S)
- N = { E, S, T, V }, T = { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, +, * }, S = { E }
- P = { E → S,
        S → T + S,
        S → T,
        T → V * T,
        T → V,
        V → 0, V → 1, V → 2, V → 3, V → 4, V → 5, V → 6, V → 7, V → 8, V→9 }
      }

Problem 5

Do the following:
- Write a grammar for the language L = { a, ab, abb, abbb, abbbb, … }.
- After you write the grammar derive the string abbb.

Problem 6

Derive the string (3+4)*6. Use a left-most derivation.

G = (N, T, P, S)
- N = { E, S, T, V }, T = { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, +, *, (,) }, S = { E }
- P = { E → S,
        S → T + S,
        S → T,
        T → F * T,
        T → F,
        F → (S),
        F → V,
        V → 0, V → 1, V → 2, V → 3, V → 4, V → 5, V → 6, V → 7, V → 8, V→9 }
      }

Problem 7

Derive the string ((1+2)*(3+4)). Use a left-most derivation.

G = (N, T, P, S)

- N = { E, S, T, V }, T = { 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, +, *, (,) }, S = { E }
- P = { E → S,
  S → T + S,
  S → T,
  T → F * T,
  T → F,
  F → (S),
  F → V,
  V → 0, V → 1, V → 2, V → 3, V → 4, V → 5, V → 6, V → 7, V → 8, V→9 }
  }