CMSC 331: Principles of Programming Language
Homework 1

1. Given the grammar:
   S → I = E
   I → a | b | c
   E → I + E | I * E | (E) | I

   Draw a parse tree and leftmost derivation for the following sentences:
   I. a = a + (b * (c))
   II. b = b * (a + (b * c))
   III. c = a + b +(c)

2. Demonstrate that the following grammar is ambiguous:
   S → I
   I → E + E | (E) | E * E | I
   E -> a-z | 0-9

3. Determine which of the sentences (a-e) are in this grammar:
   S → aScB | A | b
   A → cA | c
   B → d | A

   a. abcbd
   b. abababc
   c. cccc
   d. accd
   e. aabcdcc

4. Convert the following EBNF rules to the basic BNF notation:
   S → BA{Ac}
   A → a[b]A
   B → bc[d]A