**Problem 4.2.2.c page 206**

S -> S (S) S | ε with string (()())

1. S 🡪 S(S)S -> (S)S -> (S(S)S)S -> ((S)S)S -> (()S)S -> (()S(S)S)S -> (()(S)S)S -> (()()S)S -> (()())S -> (()())
2. S 🡪 S(S)S -> S(S) -> S(S(S)S) -> S(S(S)) -> S(S()) -> S(S(S)S()) -> S(S(S)()) -> S(S()()) -> S(()()) -> (()())
3. S

/ | | | \

S ( S ) S

( ( ) ( ) )

1. Ambiguous, because you can have multiple parses
2. The set of all strings with parentheses.

**Problem 4.2.3.a page 207**

The set of all strings of 0s and Is such that every 0 is immediately followed

by at least one 1.

S -> (0?1)\*

**Problem 4.4.1.c Page 231**

S -> S (S) S | ε

Left recursion elimination

S -> T

T -> (S) S T | ε

|  |  |  |  |
| --- | --- | --- | --- |
| Nonterminals | ( | ) | $ |
| S | S -> T | S -> T | S -> T |
| T | T -> (S) S T  T -> ε | T -> ε | T -> ε |