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March 25th Project

1.  Consider the grammar G defined by this set of rewrite rules:

{

   S → aSa

   S → bSb

   S → a

   S → b

}

1.i List 3 strings Є L(G), and 3 ∉ L.

In: aaa, bbb, aaaabaaaa, Not In: bbbaaaa, abbbbbb,bababa

1.ii Either prove that L(G) is regular by showing a regular expression for it, or prove that

it is not regular using the Pumping Theorem.

L = { w = (x : {a,b}\* where (w = x(a∪b)))}. All palindromes of odd length

1.iii If L(G) is not regular, give a concise description in set theorem terms:

{ w : … }

If we let abe the string to be pumped it is very easy to see through the pumping lemma that this language is not regular.

2. Convert the grammar for unambiguous multiplication and addition into Chomsky Normal

Form:

{

  E → E + T

  E → T

  T → T \* F

  T → F

  F → (E)

  F → id

}

A.

E → E + T

E → T

T → T \* F

T → F

F → (E)

F → id

B.

(Removing any X → Y)

E → E + T | T \* F | (E) | id

T → T \* F | (E) | id

F → (E) | id

C.

(Simplifying for addition and multiplication)

E → EaT | TmF | (E) | id

T → TmF | (E) | id

F → (E) | id

a → +

m → \*

3.  Write a grammar for the language a**m**b**n**, n > m, n-m is odd.

b must be greater than a and the remainder has to be odd, meaning that either b is even and a is odd, or the reverse. There are only two possibilities.