Assignment 4

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Problem 1: Duck at in the garden
Grammar:

S -> NP VP

NP -> NP PP
NP -> det n

VP -> NP PP
VP -> v NP

PP -> p NP

Lexical rules:

v -> [chased]
v -> [saw]

n -> [cats]
n -> [dogs]
n -> [garden]
n -> [house]

p -> [in]
p -> [behind]
p -> [from]

det -> [the]

Part 2: Duck at and the trees
Grammar:

s(s(NP, VP)) –> np(NP), vp(VP).

np(np(NP, PP)) –> np(NP), pp(PP).
np(np(DET, N)) –> det(DET), n(N).

vp(vp(VP, PP)) –> vp(VP), pp(PP).
vp(vp(V, NP)) –> v(V), np(NP).

pp(pp(P, NP)) –> p(P), np(NP).

Lexical rules:

v(v(chased)) –> [chased].
v(v(saw)) –> [sees].

n(n(cats)) –> [cats].
n(n(dogs)) –> [dogs].
n(n(garden)) –> [garden].
n(n(house)) –> [house].

p(p(in)) –> [in].
p(p(behind)) –> [behind].
p(p(from)) –> [from].

det(det(the)) –> [the].

Part 3: The garden behind the house in the garden

0 PPs	1 tree
1 PPs	2 trees
2 PPs	5 trees
3 PPs	14 trees
4 PPs	42 trees

The sequence of numbers that are represented by the number of parse trees mimic that of the Catalan numbers.

This sequence continues as :
1, 1, 2, 5, 14, 42, 132, 429, 1430, 4862, 16796, 58786, 208012, 742900, 2674440, 9694845, 35357670, 129644790, 477638700, 1767263190, 6564120420, 24466267020, 91482563640, 343059613650, 1289904147324, 4861946401452...
(from Wikipedia)