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HW 4

Part 1:

% Grammar

s --> np, vp.
np --> np, pp ; det, n.
pp --> p, np.
vp --> v, 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:

% Grammar

s(s(NP, VP)) --> np(NP), vp(VP).
np(np(DET, N)) --> det(DET), n(N).
np(np(NP, PP)) --> np(NP), pp(PP).
pp(pp(P, NP)) --> p(P), np(NP).
vp(vp(V, NP)) --> v(V), np(NP).

% the lexical rules (no need to edit below)

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 number of trees in relative to number of PP:

Catalan Numbers

| Number of PP | Number of Trees | String |
|--------------|-----------------|--|
| 0 | 1 | the dogs chased the cats |
| 1 | 2 | the dogs chased the cats in the garden |
| 2 | 5 | the dogs chased the cats in the garden behind the house |
| 3 | 14 | the dogs chased the cats in the garden behind the house in the garden |
| 4 | 42 | the dogs chased the cats in the garden behind the house in the house behind the garden |