**Exercise 7.1**

Suppose we are working with the following DCG:

s --> foo,bar,wiggle.

foo --> [choo].

foo --> foo,foo.

bar --> mar,zar.

mar --> me,my.

me --> [i].

my --> [am].

zar --> blar,car.

blar --> [a].

car --> [train].

wiggle --> [toot].

wiggle --> wiggle,wiggle.

Write down the ordinary Prolog rules that correspond to these DCG rules.

s(X,A) :- foo(X,Y), bar(Y,Z), wiggle(Z,A).

foo([choo|W],W).

foo(X,Z) :- foo(X,Y), foo(Y,Z).

bar(X,Z) :- mar(X,Y), zar(Y,Z).

mar(X,Z) :- me(X,Y), my(Y,Z).

me([i|W],W).

my([am|W],W).

zar(X,Z) :- blar(X,Y), car(Y,Z).

blar([a|W],W).

car([train|W],W).

wiggle([toot|W],W).

wiggle(X,Z) :- wiggle(X,Y), wiggle(Y,Z).

What are the first three responses that Prolog gives to the query s(X,[])?

X = [choo, i, am, a, train, toot]

X = [choo, i, am, a, train, toot, toot]

X = [choo, i, am, a, train, toot, toot, toot]

**Exercise 7.2**

The formal language *anbn* - {ε} consists of all the strings in *anbn* except the empty string. Write a DCG that generates this language.

s --> a,b.

s --> a,s,b.

a --> [a].

b --> [b].

**Exercise 7.3**

Let *anb2n* be the formal language which contains all strings of the following form: an unbroken block of *a*s of length *n* followed by an unbroken block of *b*s of length *2n*, and nothing else. For example, *abb*, *aabbbb*, and *aaabbbbbb* belong to *anb2n*, and so does the empty string. Write a DCG that generates this language.

s --> [].

s --> a,s,b.

a --> [a].

b --> [b,b].