CKY exercises

The following two tasks are meant as exercises to understand the CKY algorithm. The goal is to fill out a CKY chart on paper. Exercise 1 focuses on recognition and exercise 2 on probabilistic parsing. In both cases, use the CKY algorithm extended to cover unary rules.

In both cases we will work on variants of the following sentence:

Jag	såg	en	tiger	med	(en)	kikare
I	saw	a	tiger	with	(a)	binoculars

This sentence has a PP attachment ambiguity, and words that are ambiguous with respect to their POS-tags.

1 Exercise 1 – recognition

The goal of this exercise is to fill in a CKY recognizer chart in the style of figures 17.11 and 17.14 from Jurafsky and Martin. Do this for the sentence: "jag såg en tiger med kikare" (notice that there is no determiner before 'kikare').

Use the following (toy) grammar in this task:

```
S -> NP VP
NP -> PRON
NP -> DET N
NP -> N
NP -> NP PP
PP -> PREP NP
VP -> V NP
VP -> VP PP
VP -> V

N : {såg, tiger, kikare, med, jag, en}
PRON: {jag, en}
PREP: {med}
V: {såg, tiger, sover}
DET: {en}

NOTE:
PREP: {jag, en} is shorthand for:
PREP -> jag
PREP -> en
```

2 Exercise 2 – probabilistic parsing

The goal of this exercise is to fill in a CKY parser chart in the style of figures 14.4 from Jurafsky and Martin. The difference from exercise 1 is thus that you also have to fill in probabilities for each sub tree. Do this for the sentence: "jag såg en tiger med en kikare" (notice that there is now a determiner before 'kikare').

Use the following (toy) grammar in this task:

```
S -> NP VP 1
NP -> PRON 2/5
NP -> DET N 2/5
NP -> NP PP 1/5
PP -> PREP NP 1
VP -> V NP 1/2
VP -> VP PP 1/4
VP -> V 1/4

N -> tiger 1/2
N -> kikare 1/2
DET -> en 1
PRON -> jag 1
PREP -> med 1
V -> såg 1/2
V -> sover 1/2
```