Students:

1. Amos Maimon – 301236287
2. Tamir Moshiashvili – 316131259

ANSWERS:

## Part 1:

1. The program generates long sentences because it has recursive grammar rules.  
   The responsible grammar rules are:  
   1 NP NP PP  
   1 PP Prep NP  
   This rules for example can generate the following:  
   NP -> NP PP -> NP PP PP -> NP PP PP PP -> …  
   and can be the same for the use of the PP rule.  
   The special rule is '1 NP NP PP', since we can use a noun phrase followed by a preposition phrase a lot of times in the same sentence, yet still get valid sentence (valid grammar).
2. It happens so rarely because of the rule 'Noun Adj Noun', which is a recursive rule that repeats the Noun with adjective, is one of 5 options to 'Noun',  
   all of the rules for 'Noun' has the same weight (equals 1) so the probability of using the recursive rule is 20%.
3. For making the sentences shorter, we changed the weight for the NP rule such that there is more weight, i.e. greater probability, for the non-recursive rule,  
   the rule ' NP NP PP ' still has weight of 1, but the 'NP Det Noun' has weight of 3, making the odds for recursive NP be 25%.  
   For making the adjectives more frequent, we set the weight of the  
   rule 'Noun Adj Noun' to 5, so now the odds for getting more adjectives are 50%.

## Part 2:

1. We added two new sentence types (i.e. S non-terminals) to our grammar to support sentence like (h) and (e).
2. To support conjunction words in noun phrases and in verb phrases, but also avoid duplicated of such this, like "Amos and Daniel or Sally and the president ate." – we found that in not enough to "play" with the weights, and therefore we added to our grammar rules that block the use of conjunction words in the sentence to one for each VP or NP. Now the sentence like -"Amos and Daniel ate or pickled" is allowed, but "Amos and Daniel or Sally and the president ate." Isn't.
3. We have separated between 5 types of verbs:
   1. Verbs that influence on another object (like "ate").
   2. verbs that doesn't influence on another object like "worked")
   3. report verbs that can followed by that-clause acting (like "thought" or "claimed"), to support (e).
   4. verbs that describes a cause of something (like "perplexed"), to support (e).
   5. present progressive in singular, to support (i).
4. we separated between two nouns – Informed nouns (names) and noun the can be proper (with "the", and etc.). the separation was made for distinguish between nouns that can be added with adjective and can be use with preposition – and the nouns that can't.

## Part 4:

1. **Rule (a) – a vs. an:**  
   In order to use "a" or "an" properly we separated between nouns and adjectives that started with vowels and nouns and adjective that isn't start with vowels.

We give to each group a non-terminal. Then make rules that forced that grammar to make sure that the one (noun or adjective) which be the first – must be matched the "a" or "an".

This was done by first decide if it will be "a" or "an" – and then give the grammar to use un/vowel noun/adjective only if the first of them is matched to the first decision.

1. **Rule (b) – Yes-No question:**  
   In order to generate yes/no questions, we used a base-verbs (verbs in V1, like eat, perplex and so on) alongside the noun-phrase.  
     
   We separated the yes/no question to description question and noun with a verb.  
   The description question is for asking whether someone/something has the given followed description.  
   The next is for asking whether someone/something performed some action.  
     
   For this part, we created the tokens: YNQ, BVPG, BVP, YNQWord and the BaseVerb in some variations.  
     
   We used the same structure of NP+VPG here, as in regular sentences, but only with a base-verbs.

## Part 5:

1. **News** – the grammar can generate sentences about news report like:  
   - live news – report about an act that is happening right now.  
   - interview – session of yes/no questions with someone that answer yes or no.  
   - accusation – accusing someone about an act that happened or describing an act and searching for the one that in charge.  
     
   The rules for each were based on the existing rules, combined with terminals (part of the sentence) that related to news report.
2. **Warning sentence** – the grammar can generate a warning sentences. We followed [the Cambridge dictionary](https://dictionary.cambridge.org/grammar/british-grammar/functions/warnings) definition for warning sentences. Cambridge dictionary divide warning sentence to 3 types: weak, strong and public notices. We add to our grammar the options to make such of this.