PART 1:

Notes:

- For all the sentences the derivation rules will have "." At the end accounting for "." At the end of each sentences.
- VP and NP is been used very often while explaining. VP → Verb Phrase. NP → noun phrase.
- I have used a group called other phrase for generalizing POS tags such as "and", "to", "do", "does", "numbers", "not", "adverbs starting with wh". The non-terminal symbol for this group is denoted as W.
- The symbols used for the POS is commented in S1.gr
- The rules that were added in S1 is mentioned in each sentence section and its usage has been explained after the parse tree.

❖ **Sentence 1: Arthur is the king .**

- This sentence is parsed by S1 with the default Grammar and vocabulary that was provided.
- Parse Tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Proper Arthur))
      (VP
        (VerbT is)
        (NP
          (Det the)
          (Nbar
            (Noun king))))) .))
```

- The sentence is parsed by S1 rule with NP VP . derivation. Arthur is a proper noun which is parsed by NP directly. VP will parse the remaining part of the sentence with the rule VerbT NP. VerbT will parse "is" and NP will subphrase the sentence with the rule Det Nbar. Det will parse "the" and the word "king" will get parsed by Nbar with the rule Nbar Noun.

❖ **Sentence 2: Arthur rides the horse near the castle .**

- This sentence is also parsed by the default grammar in S1, and vocabulary that was provided.
- Parse Tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Proper Arthur))
      (VP
        (VerbT rides)
        (NP
          (Det the)
          (Nbar
```

(Nbar
(Noun horse))
(PP
(Prep near)
(NP
(Det the)
(Nbar
(Noun castle)))))))) .))

- The sentence is parsed by the S1 rule with NP VP derivation. Arthur is parsed by the proper noun part of the Noun Phrase . VP maps to the rule VerbT NP, “rides” will be parsed by VerbT and for the NP the rule Det Nbar will be chosen to parse remaining part of the sentence ,”the” will be parsed by Det and Nbar further subphrases to Nbar PP, Nbar parses the noun “horse”. The PP part uses the rule Prep NP, Prep parses the preposition “near “and NP will parse the noun “castle” with the inner level Nbar Noun.

❖ **Sentence 3: Arthur rides the plodding horse near the castle .**

- This sentence is parsed by the rule S2. This is because the word “plodding” is not defined in the vocab file.
- I labelled “plodding” as Adj as its an adjective, in vocab.gr
  - 1 Adj plodding
- The rules that were added to parse the grammar is as below,
  - I changed the existing rule to make it more generalized,
  - I changed “1 VP VerbT NP” to “1 VP Vbar NP” and added “VerbT” to the inner verb levels as below

    # Verb Phrases, Inner Level

    1 Vbar VerbT
  - And, I changed “1 NP Proper” to “1 NP Nbar”. “Proper” was added to inner level of NP.

    1 Nbar Proper
  - 1 AJ Nbar was added to noun phrase to parse plodding.
  - AJ has been defined as non-terminal symbol as adjective phrase.

    #Adjective Phrase

    1 AJ Adj
- Following rules have been added to noun phrase to parse the sentences after “plodding”.
  - 1 NP Det NP
  - 1 NP AJ Nbar
- Parse Tree:

(START
(S1
(@NP-VP
(NP
(Nbar
(Proper Arthur)))
(VP
(Vbar
(VerbT rides))
(NP
(Det the)

(Nbar
(Nbar
(Noun horse))
(PP
(Prep near)
(NP
(Det the)
(Nbar
(Noun castle)))))))) .))

- The sentence is parsed by S1 rule with NP VP . derivation. “Arthur” being the proper noun will be parsed by NP Nbar and will be parsed by Proper symbol at Np inner level. VP will parse remaining part of the sentence with the rule Vbar NP, “rides” being transitive verb will be parsed by Vbar (inner level VerbT). Non- terminal Np will parse remaining part with the rule **Det NP**, “the” will be parsed by Det, and NP will branch out to the rule **AJ Nbar**.“plodding” will be parsed as an adjective with the rule AJ ADJ. Nbar will parse remaining part with Nbar PP rule. “horse” will be parsed a noun with Nbar Noun inner level. PP will parse remaining sentence with the rule Prep NP. “near” will be parsed as preposition prep. NP will be parsed as noun, Nbar Noun inner level.

❖ **Sentence 4: the Holy Grail is a chalice .**

- The sentence is been parsed as S2 rule, this is because “Holy Grail” is not been defined in vocab file
- I named “Holy Grail” as PropNP in vocab file. As it is non people proper noun.
  - 1 PropNP Holy Grail
- The rule that has been added to parse the sentence is added to inner level of Noun phrase.
  - 1 Nbar PropNP
- Parse tree:

(START
(S1
(@NP-VP
(NP
(Det the)
(Nbar
(PropNP Holy) Grail)))
(VP
(Vbar
(VerbT is))
(NP
(Det a)
(Nbar
(Noun chalice))))) .))

- The sentence is parsed by S1 rule derivation NP VP. NP will start parsing the sentence with Det Nbar rule. “the” being determinant will be parsed by Det. **Nbar** will parse “Holy Grail” as **PropNP**. VP will parse remaining sentence with the rule Vbar NP. “Is” will be parsed by inner level verb Vbar VerbT. NP will continue parsing with the rule Det Nbar. Det will parse “a” and Nbar will parse chalice as a noun in inner level with the rule, NP Nbar, Nbar Noun.

❖ **Sentence 5: the sensational Holy Grail is a sacred chalice .**

- The sentence is parsed by S2 rule as sensational and sacred words has not been defined in vocab file.
- I named “Sensational” and “sacred” as adjectives as they are, in vocab file.
  - 1 Adj sensational
  - 1 Adj sacred
- Parse Tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Det the)
        (NP
          (AJ
            (Adj sensational))
          (Nbar
            (PropNP Holy) Grail))))
      (VP
        (Vbar
          (VerbT is))
        (NP
          (Det a)
          (NP
            (AJ
              (Adj sacred))
            (Nbar
              (Noun chalice)))))) .))
```

- The sentence was parsed after the change in vocab file with previously present rules. The sentence is parsed by S1 rule with the derivation NP VP . NP will parse the sentence with Det NP rule. Det will parse the word “the”. NP will branch out to the rule AJ Nbar. AJ will parse the adjective “sensational” with the rule AJ Adj. Nbar will parse the noun “Holy Grail”. VP will parse the remaining part with the rule Vbar NP. Vbar will parse the transitive verb “is”. NP will again branch out to AJ Nbar rule.AJ will parse “sacred” with the rule AJ Adj and Nbar will parse the noun chalice.

❖ **Sentence 6: every coconut was carried to the hottest mountains .**

- The sentence is parsed by S2 rule as “was”, “carried”, “to”,“hottest” and “mountains” are not assigned with any POS in vocab file.
- I assigned following POS in vocab:
  - 1 VerbPa was (Verb in past tense)
  - 1 VerbPa carried(verb in past tense)
  - 1 TO to(to)
  - 1 AdjS hottest (adjective in superlative form)
  - 1 NounP mountains (noun in its plural form)
- Following rules were added to the S1 file.
  - 1 VP Vbar VP NP (to the outer level of Verb Phrase)
  - 1 VP Vbar (to the outer level of Verb Phrase)
  - 1 NP W Det AJ (to the outer level of noun phrase)
  - 1 AJ AdjS NP (to the adjective phrase

- 1 Nbar NounP (to the inner level of noun phrase)
- 1 Vbar VerbPa (to the inner level of the verb phrase)
- 1 W TO (added as a rule in other phrases)

- Parse Tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Det every)
        (Nbar
          (Noun coconut)))
      (VP
        (@Vbar-VP
          (Vbar
            (VerbPa was))
          (VP
            (Vbar
              (VerbPa carried))))
        (NP
          (@W-Det
            (W
              (TO to))
            (Det the))
          (AJ
            (AdjS hottest)
            (NP
              (Nbar
                (NounP mountains))))))) .))
```

- The sentence is parsed by S1 rule with NP VP . derivation. NP will parse the sentence with the rule Det Nbar. Det will parse "every" word. Nbar will parse the noun "coconut". VP will parse the remaining part with the rule **Vbar VP NP**. **Vbar** will parse the word past tense of verb "was". VP will parse the word past tense of the verb "carried" with the inner level rule **Vbar VerbPa**. NP will parse with the rule **W Det AJ**. W will parse "to" with the rule **W TO**. Det will parse the word "the". AJ will parse the remaining part with **AdjS NP** rule. AJ will parse "hottest" with the rule AJ AdjS. NP will parse "mountains" with the inner rule **Nbar NounP** rule.

❖ **Sentence 7: sixty strangers are at the Round Table .**

- The sentence will be parsed by S2 as the words "sixty", "strangers", "are", "round table", are not assigned with any POS tags in vocab file.
- I have assigned following tags in vocab file.
  - 1 Num sixty (number)
  - 1 NounP strangers (noun in plural form)
  - 1 VerbT are (I assigned this as transitive verb)
  - 1 PropNP Round Table (proper noun non people)
- Following rules has been updated in S1 file.
  - 1 NP W NP (in the outer noun phrase)

- 1 VP Vbar PP (in the outer Verb phrase)
- 1 W Num (in other phrases)

- Parse Tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (W
          (Num sixty))
        (NP
          (Nbar
            (NounP strangers))))
      (VP
        (Vbar
          (VerbT are))
        (PP
          (Prep at)
          (NP
            (Det the)
            (Nbar
              (PropNP Round) Table)))))) .))
```

- The sentence is parsed by S1 rule with the derivation NP VP . NP will parse the sentence with the rule **W NP**. W will parse the word" sixty" with the rule **W Num**. NP will parse the plural noun " strangers" with the rule NP Nbar, Nbar NounP. VP will parse the remaining part with the rule **Vbar PP**. Vbar will parse the transitive word "are" with the inner rule Vbar VerbT. PP will parse the sentence with the rule Prep NP. Prep will parse the word "at". NP will branch out to the rule Det Nbar. Det will parse the word "the".Nbar will parse "Round Table" with the rule Nbar PropNP.

❖ **Sentence 8: Sir Lancelot might have spoken .**

- The sentence gets parsed by S2 as the words "might", "have", "spoken" words are not assigned with POS tags.
- I assigned below tags for these words in vocab file.
  - 1 MVerb might (modal verb)
  - 1 Verb have (base form of the verb)
  - 1 VerbPP spoken (verb past participle)
- Following rules have been added to S1 file.
  - 1 Vbar MVerb (to the inner level of the Verb Phrase)
  - 1 Vbar Verb (to theinner level of the verb phrase)
  - 1 Vbar VerbPP(inner level of the verb phrase)
- Parse tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Nbar
          (Proper Sir) Lancelot)))
```

```
(VP
  (Vbar
    (MVerb might))
  (VP
    (Vbar
      (Verb have))
    (VP
      (Vbar
        (VerbPP spoken))))) .))
```

- The sentence is parsed by the S1 rules with NP VP derivation. NP will parse the word " Sir Lancelot" with the rule NP Nbar, Nbar Proper. VP will parse the remaining part with the rule Vbar VP. Vbar will parse the word "might" with the inner rule **Vbar MVerb**. VP will again branch out to the rule Vbar VP. Vbar will parse the word "have" with the rule **Vbar Verb**. VP will parse the word "spoken" with the rule VP Vbar, **Vbar VerbPP**.

❖ **Sentence 9: Guinevere had been riding with Patsy for five weary nights .**

- The sentence will be parsed by S2 rule since the words "had", "been", "riding", five", "weary", nights" are not been assigned with POS tags.
- These words have been updated with POS tags as below.
  - 1 VerbPP had (verb as a past participle)
  - 1 VerbPP been (verb as a past participle)
  - 1 Verbng riding (Verb as a present participle)
  - 1 Num five (number indicator)
  - 1 Adj weary (adjective)
  - 1 NounP nights (noun in its plural form)
- Following rules have been added to S1 grammar file.
  - 1 NP W AJ (in Noun phrase rule)
  - 1 Vbar Verbng (under verb phrase)
  - 1 PP Prep NP PP (under preposition phrase)
- Parse Tree:

```
                    (START
 (S1
   (@NP-VP
     (NP
       (Nbar
         (Proper Guinevere)))
     (VP
       (@Vbar-VP
         (Vbar
           (VerbPP had))
         (VP
           (Vbar
             (VerbPP been))
           (VP
             (Vbar
               (Verbng riding))
```

```
            (PP
              (@Prep-NP
                (Prep with)
                (NP
                  (Nbar
                    (Proper Patsy))))
              (PP
                (Prep for)
                (NP
                  (W
                    (Num five))
                  (AJ
                    (Adj weary))))))))
        (NP
          (Nbar
            (NounP nights))))) .))
```

- The sentence is now been parsed with the derivation rule NP VP . This rule makes sure that the verbs are parsed completely. The NP will parse the proper noun “Guinevere”. The VP will parse with the rule Vbar VP NP, Vbar will parse the word “had” with the rule Vbar VerbPP. VP will once again branch out to the rule Vbar VP, Vbar will parse the word “ been “ with the rule Vbar VerbPP. VP will parse with the rule Vbar PP. Vbar will parse the word “riding” with the rule **Vbar Verbng**. PP will parse with the rule **Prep NP PP**. Prep will parse the word “with”. NP will parse the proper noun “patsy” with the rule NP Nbar, Nbar Proper. PP will parse with the rule Prep NP. Prep will parse the word “for”. NP will branch out to the rule **W AJ**. W will parse “five” with the rule W Num. Adj will parse “weary” with the rule **AJ Adj** . now NP from the rule Vbar VP NP will now parse the plural noun “nights”.

❖ **Sentence 10: Sir Bedevere might have been suggesting this quest .**

- This sentence will first be parsed with the grammar S2 as the word “suggesting” has not been assigned with any of the POS.
- I assigned below mentioned POS for the word in vocab file.
  - 1 Verbng suggesting (present participle form of verb)
- Parse Tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Nbar
          (Proper Sir) Bedevere)))
      (VP
        (Vbar
          (MVerb might))
        (VP
          (Vbar
            (Verb have))
          (VP
            (Vbar
```

(VerbPP been))
(VP
(Vbar
(Verbng suggesting))
(NP
(Det this)
(Nbar
(Noun quest))))))) .))

- The sentence was parsed by S1 grammar with previously existing rules and the derivation NP VP. NP parses " Sir Bedevere" with the rule NP Nbar, Nbar Proper. Vp will parse with the rule Vbar VP. Vbar will parse the word " might" with rule Vbar MVerb. VP will once again branch out to the rule Vbar VP. Vbar will parse the word "have" with the rule Vbar Verb. VP branches out to the rule Vbar VP NP. Vbar will parse the word "been" with the rule Vbar VerbPP. VP will parse " suggesting" with the rule VP Vbar, Vbar Verbng. NP will parse with the rule Det Nbar. Det will parse "this" and Nbar will parse the noun "quest" with the rule Nbar Noun.

❖ **Sentence 11: the Britons migrate south frequently .**

- The sentence will be parsed by the grammar S2 as the words "Britons", "migrate", "south", "frequently" are not assigned with any POS tags.
- I assigned below POS for the words in vocab file.
  - 1 Props Britons (proper noun in its plural form)
  - 1 Verb migrate (Verb)
  - 1 AVerb south (AdVerb)
  - 1 AVerb frequently (Adverb)
- Following rules have been added to the S1 grammar file.
  - 1 Vbar AVerb (inner level of Verb phrase)
  - 1 Nbar Props (inner level of noun phrase)
- Parse tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Det the)
        (Nbar
          (Props Britons)))
      (VP
        (Vbar
          (Verb migrate))
        (VP
          (Vbar
            (AVerb south))
          (VP
            (Vbar
              (AVerb frequently)))))) .))
```

- The sentence is ow been parsed by S1 with the derivation NP VP. NP will parse with the rule Det Nbar. Det will parse the word "the". Nbar will parse the word "Britons" with the rule **Nbar Props**. VP will parse

with the rule Vbar VP. Vbar will parse the word"migrate" with the rule Vbar Verb. VP will again branh out to the rule Vbar VP. Vbar this time will parse the word "south" with the rule **Vbar AVerb**. VP will parse the word " frequently" with the rule VP Vbar, Vbar AVerb.

- **Sentence 12: Arthur and Guinevere ride frequently near the castle .**
  - The sentences parses with the grammar S2 as the words "and" and "ride" are not tagged with any POS.
  - I tagged these words with below POS in vocab file.
    - 1 Conj and (conjunction)
    - 1 Verb ride (Verb)
  - Following were the changes made to S grammar
    - 1 W Conj (under other phrases)
    - 1 NP Nbar W NP (under noun phrases)
  - Parse Tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (@Nbar-W
          (Nbar
            (Proper Arthur))
          (W
            (Conj and)))
        (NP
          (Nbar
            (Proper Guinevere))))
      (VP
        (Vbar
          (Verb ride))
        (VP
          (Vbar
            (AVerb frequently))
          (PP
            (Prep near)
            (NP
              (Det the)
              (Nbar
                (Noun castle))))))) .))
```

  - The sentence is parsed by the rules of S1 grammar with the derivation NP VP. Np will parse with the rule **Nbar W NP**. Nbar will parse the word "Arthur" with the rule Nbar Proper. W will parse "and" with the rule **W Conj**. NP will parse the word "Guinevere" with the rule NP Nbar, Nbar Proper. Vp will parse with rule Vbar VP. Vbar will parse the word "ride" with the rule Vbar verb. VP will again branch out to the rule Vbar PP. Vbar will parse the word "frequently" with the rule Vbar AVerb. PP will parse with the rule Prep NP. Prep will parse the word "near". NP will parse with the rule Det Nbar. Det will parse the word "the". Nbar will parse the word "castle" with the rule Nbar noun.

- **Sentence 13: he suggests to grow fruit at home .**

- The sentence will be parsed with S2 as the words “he”, “suggests”, “grow” as not tagged with any POS in vocab file.
- The words are tagged with POS in the file vocab as below:
  - 1 PPro he (personal pronoun)
  - 1 SVerb suggests (singular verb form for third person)
  - 1 VerbP grow (present form of the verb)
- Following are the rules added to the S1 file:
  - 1 Vbar SVerb (under the inner level of the verb phase)
  - 1 Vbar VerbP (under the inner level of the verb phase)
  - 1 VP Vbar W VP
  - 1 PP Prep
  - 1 NP Nbar PP Nbar
  - 1 Nbar PPro

- Parse Tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Nbar
          (PPro he)))
      (VP
        (@Vbar-W
          (Vbar
            (SVerb suggests))
          (W
            (TO to)))
        (VP
          (Vbar
            (VerbP grow))
          (NP
            (@Nbar-PP
              (Nbar
                (Noun fruit))
              (PP
                (Prep at)))
            (Nbar
              (Noun home)))))) .))
```

- The sentence will now be parsed by S1 with the derivation rule NP VP. NP will parse the word “he”with the rule NP Nbar, **Nbar PPro**. VP will parse with the rule **Vbar W VP**. Vbar will parse the words “suggests” with the rule **Vbar SVerb**. W will parse the word “to” with the rule W TO. VP will parse with the rule Vbar NP. Vbar will parse the word “grow” with the rule **Vbar VerbP**. NP will parse with the rule **Nbar PP Nbar**. Nbar will parse the noun “fruit” with the rule Nbar Noun. PP will parse the word”at” with the rule **PP Prep** . Another Nbar will parse the word “home” with the rule Nbar Noun.

❖ **Sentence 14: riding to Camelot is not hard .**

- The sentence will parse with S2 grammar, as the words “Camelot”, “not”, “hard” are not tagged with any POS in vocab file.
- The words are been tagged with the POS in vocab file as shown below:
  - 1 propNP Camelot (proper nouns which are not people referenced)
  - 1 Not not (Not tag)
  - 1 Adj hard (adjective)
- Following rules have been added in the S1 grammar file:
  - 1 W Not (under other phrases)
  - 1 VP Vbar W (under the verb phrases)
  - 1 VP Vbar W AJ (under the Verb phrases)
  - 1 S1 VP NP VP . (The derivation rule in S1 Grammar)
- Parse tree:

```
(START
  (S1
    (@@VP-NP-VP
      (@VP-NP
        (VP
          (Vbar
            (Verbng riding))
          (W
            (TO to)))
        (NP
          (Nbar
            (PropNP Camelot))))
      (VP
        (@Vbar-W
          (Vbar
            (VerbT is))
          (W
            (Not not)))
        (AJ
          (Adj hard)))) .))
```

- The sentence will be parsed by S1 grammar rules with the derivation **VP NP VP .** VP will parse with the **Vbar W** rule.Vbar will parse the word “riding” with the rule Vbar Verbng. W will parse the word “to” with the rule W TO. NP will parse the word “Camelot” with the rule , NP Nbar, Nbar PropNP. Vp will be parse with the rule **Vbar W AJ**. Vbar will parse the word “is” with the rule Vbar VerbT. W will parse the word “not” with the rule **W Not**. AJ will parse “hard” with the rule AJ Adj.

❖ **Sentence 15: do coconuts speak ?**

- The words “do”, “coconuts”, “speak” and ? are not tagged with any of the POS, this is why its been parsed by S2 grammar rules.
- I have tagged with the below mentioned POS in vocab words for the above words:
  - 1 Dos do
  - 1 NounP coconuts (plural nouns)
  - 1 Verb speak (verb)
- Below are the rules that have been added to the S1 grammar file:

- 1 S1 W NP ? (new derivation for S1 rules)
- 1 W Dos (under other phrases)
- 1 NP Nbar VP (under the noun phrases)

- Parse Tree:

```
(START
  (S1
    (@W-NP
      (W
        (Dos do))
      (NP
        (Nbar
          (NounP coconuts))
        (VP
          (Vbar
            (Verb speak))))) ?))
```

- The sentence will be parsed by S1 rules with the derivation **W NP ?**. W will parse the word "do", with rule **W Dos**. NP will parse with the rule **Nbar VP**. Nbar will parse "coconuts" with the rule Nbar NounP. VP will parse the word "speak" with the rule VP Vbar, Vbar Verb. The question mark will be parsed by ? symbol in the derivation

❖ **Sentence 16: why does England have a king ?**

- The sentence will be parsed by S2 as the words "why", "does", "England" are not tagged with any POS.
- These words are tagged with POS in vocab file with below mentioned tags:
  - 1 Whad why (Adverbs starting with WH)
  - 1 Dos does
  - 1 PropNP England (proper nouns which are not people)
- Below are the rules that has been added to S1.
  - 1 W Whad W (other phrases)
- Parse trees:

```
(START
  (S1
    (@W-NP
      (W
        (Whad why)
        (W
          (Dos does)))
      (NP
        (Nbar
          (PropNP England))
        (VP
          (Vbar
            (Verb have))
          (NP
            (Det a)
            (Nbar
              (Noun king)))))) ?))
```

- The sentence is parsed with the rule of S1 grammar with the derivation W NP ?. W will parse with the rule **Whad W**. Whad will parse the word "why" and W will parse the word "does". Np will parse the word Nbar VP. Nbar will parse the word "England" with the rule Nbar PropNP. VP will parse with the rule Vbar NP. Vbar the parse word "have" with the rule Vbar Verb. NP will again branch out to the rule Det Nbar. Det will parse "a". Nbar will parse the word "king" with the rule Nbar Noun.

Challenge Sentence:

- **Sentence 1: Arthur rode to Camelot and drank from his chalice .**
  - The sentence will be parsed by the S2 grammar rules as "rode", "drank" and "his" words are not tagged with any POS.
  - The words are tagged with POS in vocab file as shown below:
    - 1 VerbPa drank (past participle of verb)
    - 1 Pppn his (personal pronouns with possessive actions)
    - 1 VerbPa rode
  - The following rules are been assigned to S1 grammar file.
    - 1 Nbar Pppn (inner level of noun phrase)
    - 1 S1 NP NP . (new derivation rule for S1 grammar)
    - 1 VP Vbar PP NP (Verb phrase)
    - 1 NP Nbar NP (noun phrase)
    - 1 NP Nbar W VP (noun phrase)
  - Parse Tree:

```
(START
  (S1
    (@NP-NP
      (NP
        (Nbar
          (Proper Arthur))
        (VP
          (Vbar
            (VerbPa rode))
          (W
            (TO to))))
      (NP
        (@Nbar-W
          (Nbar
            (PropNP Camelot))
          (W
            (Conj and)))
        (VP
          (Vbar
            (VerbPa drank))
          (PP
            (Prep from)
            (NP
              (Nbar
```

(Pppn his))
(NP
(Nbar
(Noun chalice))))))))) .))

- The sentence has been parsed by S1 rules with **NP NP .** derivation. NP will parse with the rule Nbar VP. Nbar will parse the word “Arthur” with the rule Nbar Proper. VP will subparse with the rule Vbar W . Vbar will parse the word “rode” with the rule Vbar VerbPa. W will parse the word “to”. Another Np from the derivation rule will parse with the rule **Nbar W VP**. Nbar will parse the word Camelot with the rule Nbar PropNP. W will parse “and” with the rule W Conj. VP will subparse with the rule **Vbar PP NP**. Vbar will parse “drank” with the rule Vbar VerbPa. PP will in turn subparse “from” with the rule PP Prep. NP will parse with the rule **Nbar NP**. Nbar will parse “his” with the rule **Nbar Pppn**. NP will parse “chalice”, with the rule NP Nbar, Nbar Noun.

❖ **Sentence 2: Arthur knows Patsy , the trusty servant .**

- The sentence will be parsed by the S2 grammar rules as the words “knows”, “,”, “trusty” are not defined with any POS.
- I defined following POS in vocab as below:
  - 1 SVerb knows (verb in its plural form)
  - 1 Adj trusty (adjective)
- Following rules have been updated in S1 grammar rules file:
  - 1 NP , Det AJ
- Parse Tree:

```
(START
  (S1
    (@NP-VP
      (NP
        (Nbar
          (Proper Arthur)))
      (VP
        (Vbar
          (SVerb knows))
        (NP
          (Nbar
            (Proper Patsy))
          (NP
            (@,-Det ,)
              (Det the))
            (AJ
              (Adj trusty)
              (NP
                (Nbar
                  (Noun servant))))))))) .))
```

- The sentence is now being parsed by the S1 grammar rules with the derivation NP VP . Np subparses with the rule Nbar VP. Nbar will parse the word “Arthur”, with the rule Nbar Proper. VP subparses with the rule Vbar NP. Vbar parses the word “knows” with the rule Vbar SVerb.NP subparses with the rule Nbar NP. Nbar will parse the word “Patsy” with the rule Nbar Proper. NP

again subparses with the rule **, Det AJ**. , will parse ",". Det will parse "the". AJ will subparse with the rule Adj NP. Adj parses "trusty" , NP parses "servant" with the rule NP Nbar, Nbar Noun.

PART 2:

Sentence1: the strangers have been riding near the hottest mountains .

- Parse Tree:

```
(START
  (S2
    (_Det
      (Det the)
      (_NounP
        (NounP strangers)
        (_Verb
          (Verb have)
          (_VerbPP
            (VerbPP been)
            (_Verbng
              (Verbng riding)
              (_Prep
                (Prep near)
                (_Det
                  (Det the)
                  (_AdjS
                    (AdjS hottest)
                    (_NounP
                      (NounP mountains)
                      (_Misc
                        (Misc .)))))))))))))
```

This sentence is made up of the words that are already parsed in the form of other sentences. Even then, the sentence will not be parsed by S1 grammar derivation rules.This proves that the structure will not be parsed by the written grammar.

The rules that will be matched the former part is as shown below:
The sentence starts with NP VP . derivation. The NP part will be parse with Det NP parsing "the" "strangers" part and branching to Vbar VP twice parsing "have", "been", "riding" part of the sentence and branching to VBar PP. PP will parse with the rule Prep NP. Prep will parse "near"

The part of the sentence that will not be parsed by the existing grammar is " the hottest mountains". This is because there is no rule in the noun phrase in which preposition follows the determinant.

Sentence 2: Round Table frequently sun suggesting and knows not weary .

- Parse Tree:

```
(START
```

```
(S1
  (@NP-VP
    (NP
      (Nbar
        (PropNP Round) Table))
      (VP
        (Vbar
          (AVerb frequently))
        (NP
          (Nbar
            (Noun sun))
          (VP
            (Vbar
              (Verbng suggesting))
            (W
              (Conj and))))))
    (VP
      (@Vbar-W
        (Vbar
          (SVerb knows))
        (W
          (Not not)))
      (AJ
        (Adj weary)))) .))
```

- These Bunch of words are not even a proper English sentence even then, the grammar in S1 parses it. This accounts for over -generalization.

  The sentence will be parsed with the derivation rule NP VP . NP will parse with the rule Nbar VP. “Round Table” will be parsed by Nbar with the rule Nbar PropNP. VP will branchout to the rule Vbar NP. “frequently” will be parsed with the rule Vbar AVerb. NP will be branched out to the rule Nbar VP. “sun” will be parsed by the Nbar with the rule Nbar Noun. VP will parse “suggesting” and “and” with the rule Vbar W. Vbar branching out to Vbar Verbng, and W to W Conj. The VP part of derivation rule will parse with the rule Vbar W AJ. “knows” will be parsed by Vbar with the rule Vbar SVerb. “to” will be parsed by the rule W TO. “weary” will be parsed by the rule AJ Adj.

  This tells that it does not matter if the sentence is validated english sentence, unless the POS matches the rules in the grammar the bunch of words still get parsed.