CS7347 Test 2, Noah Gardner, 000843905

1. [**Points 15**] A grammar is ambiguous if it can generate a string in more than two ways. In other words, a string generated by the grammar does not have a unique parse tree.

   Given grammar:

S	→	a B | b A
A	→	a | a S | b A
B	→	b | b S | a B B

   Is the above grammar ambiguous? Provide an example and show parse tree to validate your answer.

2. [**Points 15**] Describe issue of BLEU Score. Given candidate translation sentences and their references below, compute modified BLEU score.

   Candidate 1: It is a guide to action which ensures that the military always obeys the commands of the party.

   Candidate 2: It is to ensure the troops forever hearing the activity guidebook that party direct.

   Reference 1: It is a guide to action that ensures that the military will forever heed Party commands.

   Reference 2: It is the guiding principle which guarantees the military forces always being under the command of the Party.

   Reference 3: It is the practical guide for the army always to heed the directions of the party.

   Evaluate your translation model performance using BLEU score where n-gram order, $N = 2$. Please show the best reference during your computation.

3. [**Points 10**] Given a grammar below

NP	→	Det | Nom
Nom	→	AP | Nom
AP	→	Adv | A
Det	→	a | an
Adv	→	very | extremely
AP	→	heavy | orange | tall
A	→	heavy | orange | tall | muscular
Nom	→	book | orange | man

   Show a parse tree for the following sentences:

   Sentence 1: A very heavy orange book **Sentence 2:** A very tall extremely muscular man

4. [**Points 5**] Write down the differences between attachment ambiguity and coordination ambiguity.

5. [**Points 15**] Suppose you build two summarizer systems, and your systems generates the following summary. You named your summarizer as S1 and S2, respectively. You are also given reference summary below.

   S1 Summary: neymar scored his side's second goal with a curling free kick, and 15 minutes to play in the 2-2 draw at sevilla on saturday night, according to reports in spain.

   S2 Summary: barcelona's neymar substituted in 2-2 draw at sevilla on saturday night, spain's kamui kobayashi claims a late free kick in the champions league after his second goal with the score

   Reference summary: neymar was taken off with barcelona 2-1 up against sevilla. the brazil captain was visibly angry, and barca went on to draw 2-2. neymar has been replaced 15 times in 34 games this season. click here for all the latest barcelona news.

   Please compute the performance of your system using ROUGE-1 and ROUGE-2 - precision, recall, and f1 score metrics and compare both systems with respective ROUGE metrics (e.g., ROUGE-1 S1 vs. ROUGE-1 S2). Based on your comparison, which one of the ROUGE metrics would you select to evaluate your system performance?

6. [**Points 5**] Given a grammar below

S	→	NP VP
VP	→	Vi
VP	→	Vt NP
VP	→	VP PP
NP	→	DT NN
NP	→	NP PP
PP	→	IN NP

Vi	→	'sleeps'
Vt	→	'saw'
NN	→	'man'
NN	→	'woman'
NN	→	'telescope'
NN	→	'dog'
DT	→	'the'
IN	→	'with'
IN	→	'in'

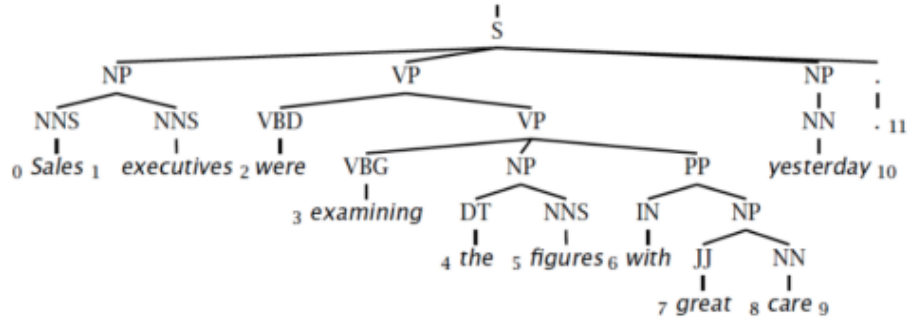
   Show that this grammar is ambiguous and produces two different parse tree for the following sentence.

   Sentence: the man saw the dog with the telescope

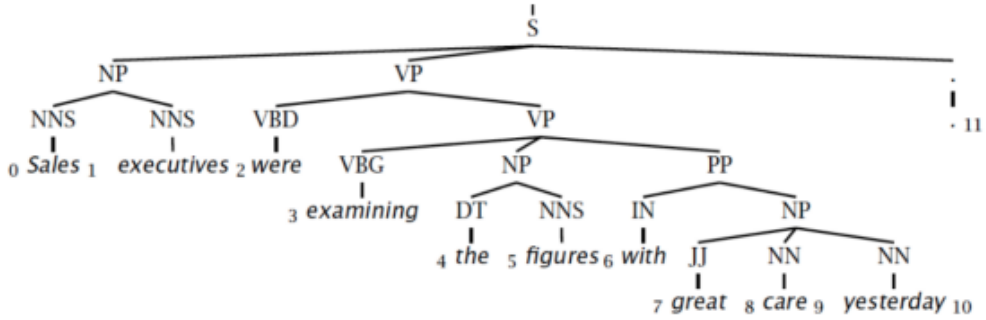
7. [**Points 20**] Evaluate the following example and compute precision, recall and F1 scores.

8. [**Points 5**]] In transition-based parsing we see dependency structure were provided, then why we need to parse the sentence while given the structures?

Gold standard brackets: **S-(0:11)**, **NP-(0:2)**, VP-(2:9), VP-(3:9), **NP-(4:6)**, PP-(6-9), NP-(7,9), NP-(9:10)



Candidate brackets: **S-(0:11)**, **NP-(0:2)**, VP-(2:10), VP-(3:10), **NP-(4:6)**, PP-(6-10), NP-(7,10)



9. [**Points 5**] What is CNF form? Why is Chomsky Normal Form used?

   S → a X b X
   X → a Y | b Y | null
   Y → X | c

   Convert this CFG to CNF.

10. [**Points 5**] How would you encode sentence using deep neural network? Show details architecture of your network with an example sentence.