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Ling 473

07/27/2017

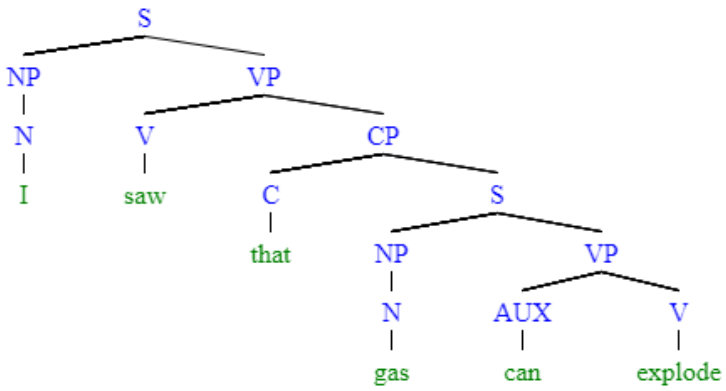
Assignment I

Question 1

Question 2

a. I saw/understood that gas, in general, is capable of exploding.

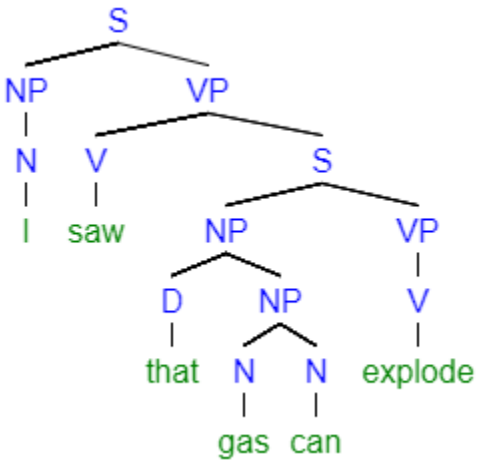
a.



b. (S (NP (PRP I))(VP (VBD saw)(SBAR (IN that)(S (NP (NN gas))(VP (MD can)(VB explode))))))

b. I saw that particular gas container explode.

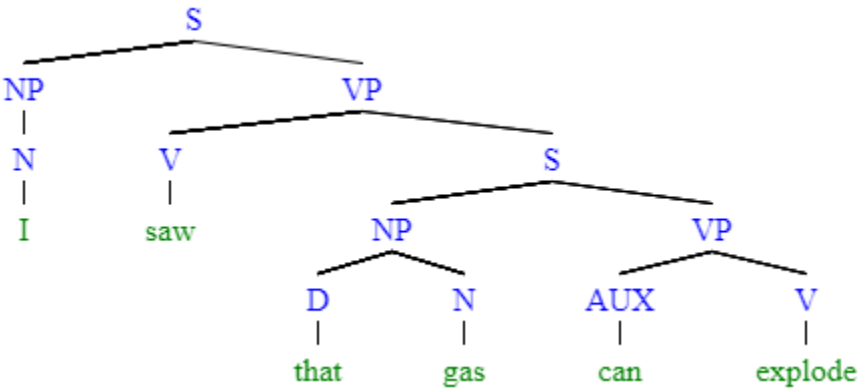
a.



b. (S (NP (PRP I))(VP (VBD saw) (SBAR (NP (DT that) (NP (NN gas)(NN can)))(VP (VB explode)))))

c. I saw/understood that a particular gas is capable of exploding.

a.



b. (S (NP (PRP I))(VP (VBD saw)(SBAR (NP (DT that) (NN gas))(VP (MD can)(VB explode)))))

Question 3

Six-letter "words" with at least one vowel = All six-letter "words" – six-letter "words with only constants

➔ $26^6 - 21^6$

Six-letter "words" that contain all vowels {a e I o u}

➔ 5^6

Six-letter "words" with at least one vowel, yet might not contain all vowels

➔ $26^6 - 21^6 - 5^6 = 223{,}134{,}030$

Question 4

$$\frac{9!}{4!\,2!} = 7{,}560$$

The given characters can be arranged in 7,560 ways.

Question 5

a. There are 60 possible pair comparisons between documents on the same topic.
   a. Conference Proceeding : $\binom{7}{2} = 21$
   b. Journal Articles: $\binom{9}{2} = 36$
   c. Workshop Abstracts $\binom{3}{2} = 3$
   d. Total = 21+36+3 =60

b. There are 111 possible pair comparisons between documents on different topics.
   a. **(7 × 9) + (7 × 3) + (9 × 3) = 111**

Extra Credit

Table 1 below shows an example unordered sets of 3 items that can be formed from a set of 4 distinct items while allowing repetition in the output set. In this case, n = 4, and k = 3, and the original data set is {1,2,3,4}.

- Chosen sets that start with 1 = the number of {1,X,Y} [unordered, no repetition] + the number of {1,X,X} [repetition]
  - The number of {1,X,Y} = choosing 2 items from set {1,2,3,4}
  - $\binom{4}{2} + 4 = 10$
- Chosen sets that start with 2 (similar concept…)
  - The number of {2,X,Y} = choosing 2 items from set {2,3,4}
  - $\binom{3}{2} + 3 = 6$
- Chosen sets that start with 3
  - $\binom{2}{2} + 2 = 3$
- Chosen sets that start with 4
  - $\binom{1}{2} + 1 = 1$

Looking at the pattern above, it's determined that the expression below will be a good representation for cases as such

$$\sum_{i}^{n} \binom{i}{k-1} + i$$

Table 1

Sets that start with 1	111	112	113	114
	121	122	123	124
	131	132	133	134
	141	142	143	144
Sets that start with 2	222	221	223	224
	211	212	213	214
	231	232	233	234
	241	242	243	244
Sets that start with 3	333	331	332	334
	311	312	313	314
	321	322	323	324
	341	342	343	344
Sets that start with 4	444	441	442	443
	411	412	413	414
	421	422	423	424
	431	432	433	434

Duplicate Sets