

1.

α.

$$U(1, 1) = -0.04 + \gamma * (0.8 * U(2, 1) + 0.1 * U(1, 2) + 0.1 * U(1, 1))$$

$$U(1, 2) = -0.04 + \gamma * (0.8 * U(1, 1) + 0.1 * U(1, 2) + 0.1 * U(1, 2))$$

$$U(1, 3) = -0.04 + \gamma * (0.8 * U(1, 2) + 0.1 * U(2, 3) + 0.1 * U(1, 3))$$

$$U(2, 1) = -0.04 + \gamma * (0.8 * U(3, 1) + 0.1 * U(2, 1) + 0.1 * U(2, 1))$$

$$U(2, 3) = -0.04 + \gamma * (0.8 * U(1, 3) + 0.1 * U(2, 3) + 0.1 * U(2, 3))$$

$$U(3, 1) = -0.04 + \gamma * (0.8 * 1 + 0.1 * U(2, 1) + 0.1 * U(3, 1))$$

	0	1	2	3	4	5
Iteration	U(1, 1)	U(1, 2)	U(1, 3)	U(2, 1)	U(2, 3)	U(3, 1)
0	0	0	0	0	0	0
1	-0.04	-0.04	-0.04	-0.04	-0.04	0.68
2	-0.08	-0.08	-0.08	0.44	-0.08	0.74
3	0.26	-0.11	-0.11	0.57	-0.11	0.79
4	0.38	0.13	-0.14	0.63	-0.14	0.8
5	0.46	0.26	0.03	0.65	-0.17	0.81

b.

Iteration	Q(1, 1, right)	Q(2, 1, right)	Q(3, 1, up)
0	0	0	0
1	-0.04	-0.04	0.77
2	-0.07	0.58	0.85
3	0.43	0.71	0.86
4	0.58	0.73	0.86
5	0.61	0.73	0.86
6	0.62	0.73	0.86
7	0.62	0.73	0.86

2.

a. $P(\text{"the wumpus smells the gold"})$

$$= P(\text{wumpus}|\text{the})P(\text{smells}|\text{wumpus})P(\text{the}|\text{smells})P(\text{gold}|\text{the})$$

$$= \frac{P(\text{the wumpus})}{P(\text{the})} * \frac{P(\text{wumpus smells})}{P(\text{wumpus})} * \frac{P(\text{smells the})}{P(\text{smells})} * \frac{P(\text{the gold})}{P(\text{the})}$$

$$= 0.5 * 0.45 * 0.67 * 0.13$$

$$= 0.02$$

b. $P(\text{"the wumpus is dead"})$

$$= P(\text{wumpus}|\text{the})P(\text{is}|\text{wumpus})P(\text{dead}|\text{is})$$

$$= \frac{P(\text{the wumpus})}{P(\text{the})} * \frac{P(\text{wumpus is})}{P(\text{wumpus})} * \frac{P(\text{is dead})}{P(\text{is})}$$

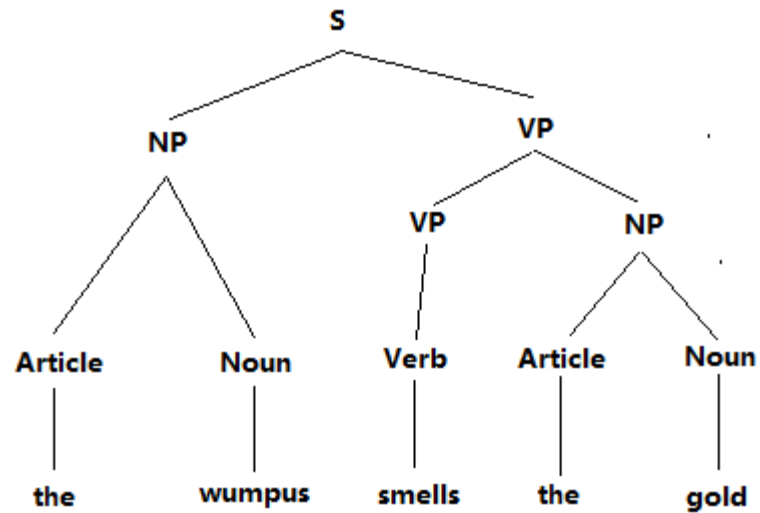
$$= 0.5 * 0.55 * 1$$

$$= 0.28$$

3.

a. "the wumpus smells the gold"

Only have one parse tree

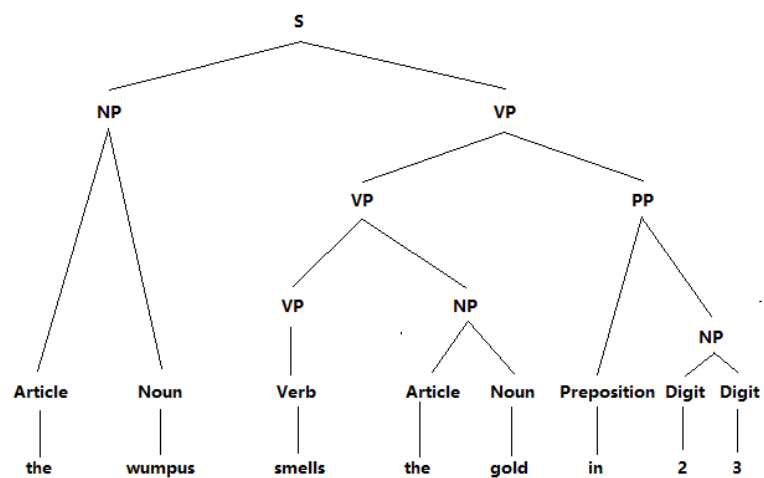


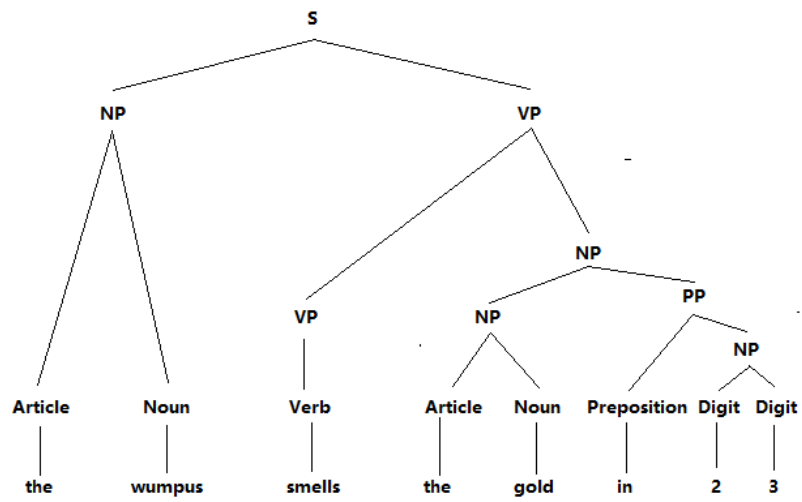
b. "the wumpus smells the gold in 2 3"

Have two possible parse trees:

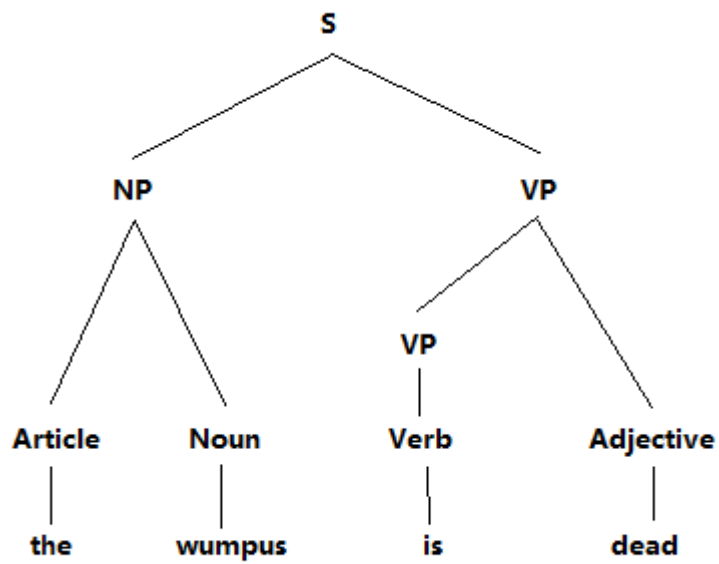
1. "in 2 3" refers to the wumpus

2. "in 2 3" refers to the gold



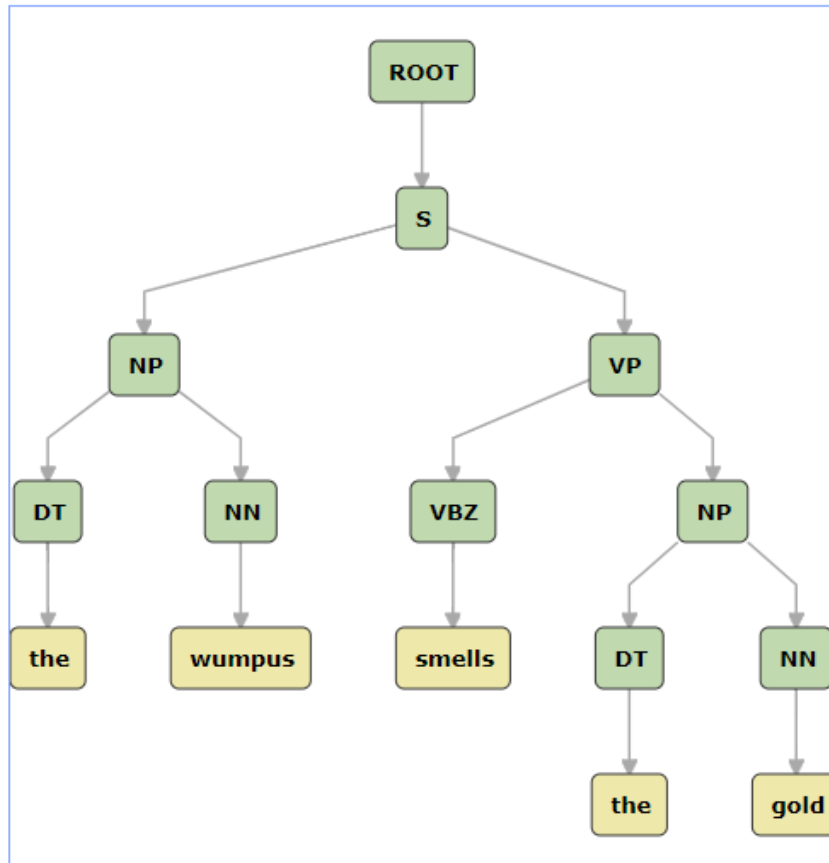


c. "the wumpus is dead"

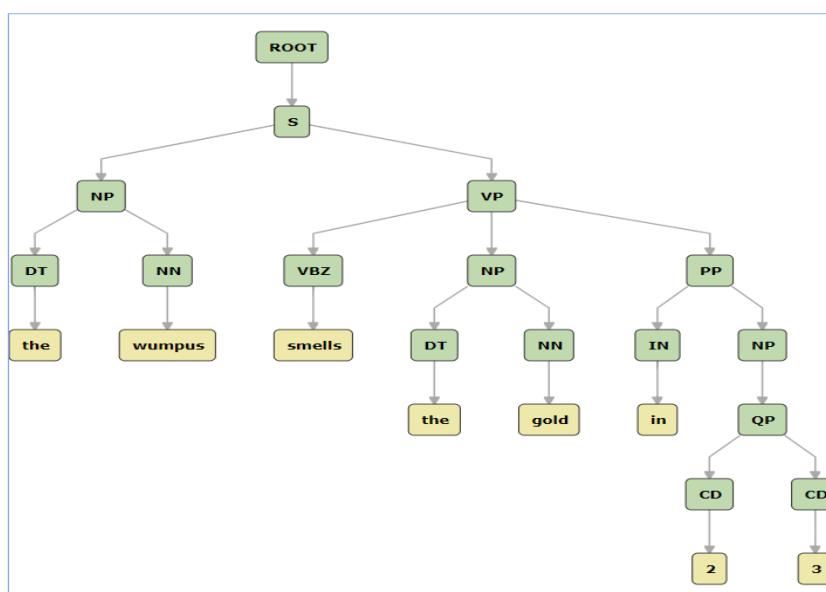


4.

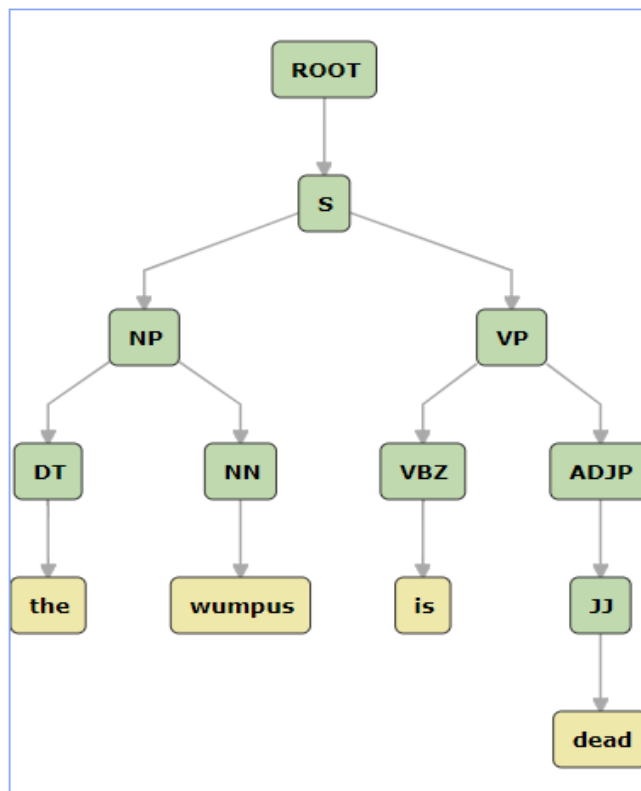
a.



b.



C.



5.

	0	1	2	3	4	5
Iteration	U(1, 1)	U(1, 2)	U(1, 3)	U(2, 1)	U(2, 3)	U(3, 1)
6	0.49	0.34	0.13	0.66	-0.05	0.81
7	0.51	0.37	0.21	0.66	0.04	0.81
8	0.51	0.39	0.25	0.66	0.12	0.81
9	0.52	0.4	0.27	0.66	0.16	0.81
10	0.52	0.41	0.29	0.66	0.18	0.81
11	0.52	0.41	0.3	0.66	0.2	0.81

12	0.52	0.41	0.3	0.66	0.21	0.81
13	0.52	0.41	0.3	0.66	0.21	0.81

The final utility values for the 6 non-terminal states are:

0.52, 0.41, 0.3, 0.66, 0.21, 0.81