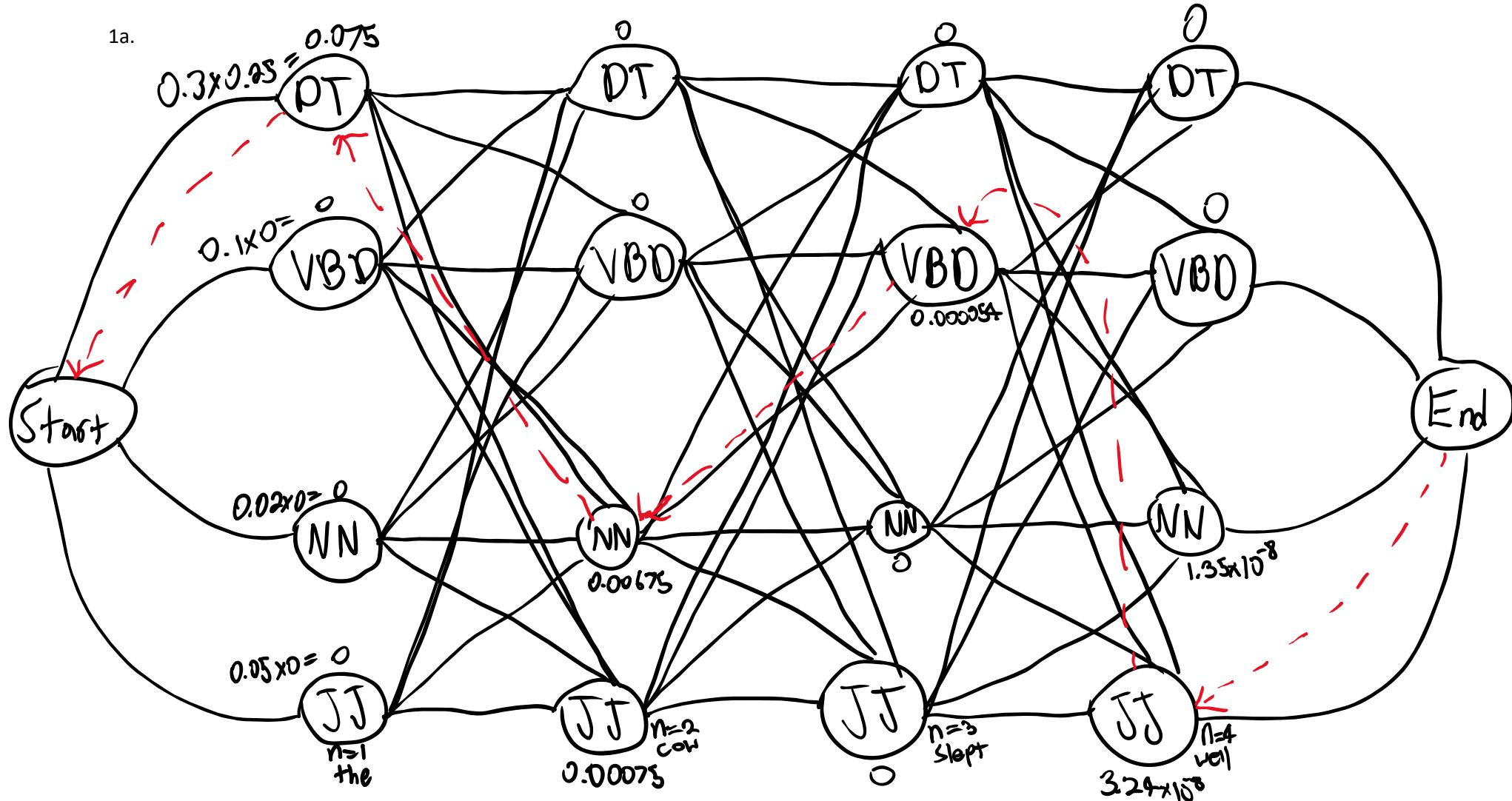


Homework 4

1a.



$n_1 - n_2$

Highlight is max

	DT	VBD	NN	JJ
DT	$0.075 \times 0.05 \times 0 = 0$	$0.075 \times 0.15 \times 0 = 0$	$0.075 \times 0.3 \times 0.3 = 0.00675$	$0.075 \times 0.2 \times 0.05 = 0.0075$
VBD	$0 \times 0.001 \times 0 = 0$	$0 \times 0.002 \times 0 = 0$	$0 \times 0.2 \times 0.3 = 0$	$0 \times 0.005 \times 0.05 = 0$
NN	$0 \times 0.35 \times 0 = 0$	$0 \times 0.04 \times 0 = 0$	$0 \times 0.005 \times 0.3 = 0$	$0 \times 0.002 \times 0.05 = 0$
JJ	$0 \times 0.002 \times 0 = 0$	$0 \times 0.2 \times 0 = 0$	$0 \times 0.1 \times 0.3 = 0$	$0 \times 0.01 \times 0.05 = 0$

 $n_2 - n_3$

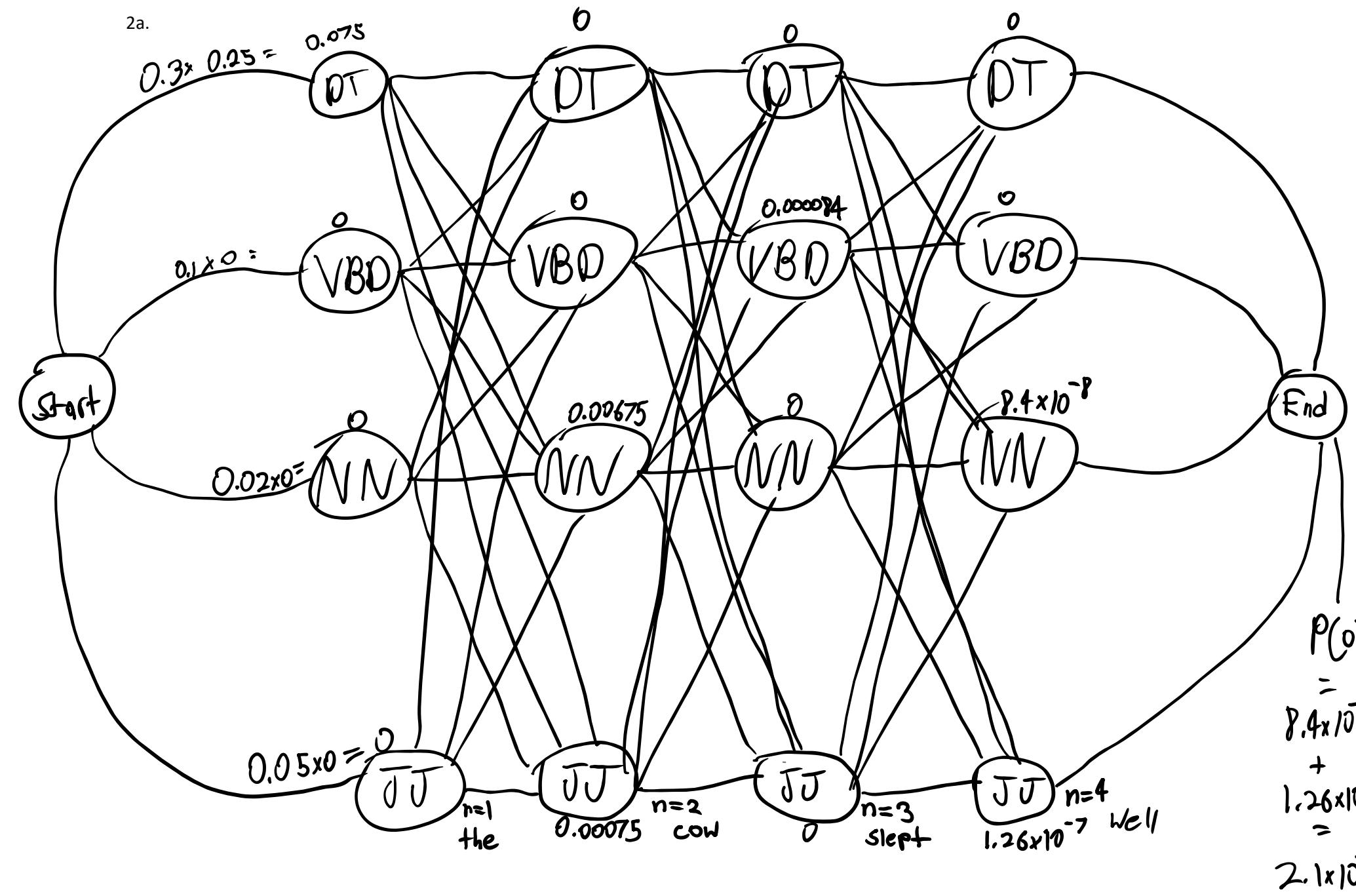
	DT	VBD	NN	JJ
DT	$0 \times 0.05 \times 0 = 0$	$0 \times 0.15 \times 0 = 0$	$0 \times 0.3 \times 0 = 0$	$0 \times 0.2 \times 0 = 0$
VBD	$0 \times 0.001 \times 0 = 0$	$0 \times 0.002 \times 0 = 0$	$0 \times 0.02 \times 0 = 0$	$0 \times 0.005 \times 0 = 0$
NN	$0.00675 \times 0.35 \times 0 = 0$	$0.00675 \times 0.04 \times 0 = 0$	$0.00675 \times 0.005 \times 0 = 0$	$0.00675 \times 0.002 \times 0 = 0$
JJ	$0.00075 \times 0.002 \times 0 = 0$	$0.00075 \times 0.2 \times 0 = 0$	$0.00075 \times 0.05 \times 0 = 0$	$0.00075 \times 0.01 \times 0 = 0$

 $n_3 - n_4$

	DT	VBD	NN	JJ
DT	$0 \times 0.05 \times 0 = 0$	$0 \times 0.15 \times 0 = 0$	$0 \times 0.3 \times 0.05 = 0$	$0 \times 0.2 \times 0.3 = 0$
VBD	$0 \times 0.001 \times 0 = 0$	$0 \times 0.002 \times 0 < 0$	$0 \times 0.02 \times 0.05 = 0$	$0 \times 0.005 \times 0.3 = 0$
NN	$0.000054 \times 0.35 \times 0 = 0$	$0.000054 \times 0.04 \times 0 = 0$	$0.000054 \times 0.005 \times 0.05 = 1.35 \times 10^{-8}$	$0.000054 \times 0.002 \times 0.3 = 3.24 \times 10^{-8}$
JJ	$0 \times 0.002 \times 0 = 0$	$0 \times 0.2 \times 0 = 0$	$0 \times 0.2 \times 0.05 = 0$	$0 \times 0.01 \times 0.3 = 0$

1b. The most likely sequence of tags is DT, NN, VBD, JJ.

2a.



$$\alpha_r(j) = \sum_{i=1}^N \alpha_{r-1}(i) a_{ri} b_i(0_r)$$

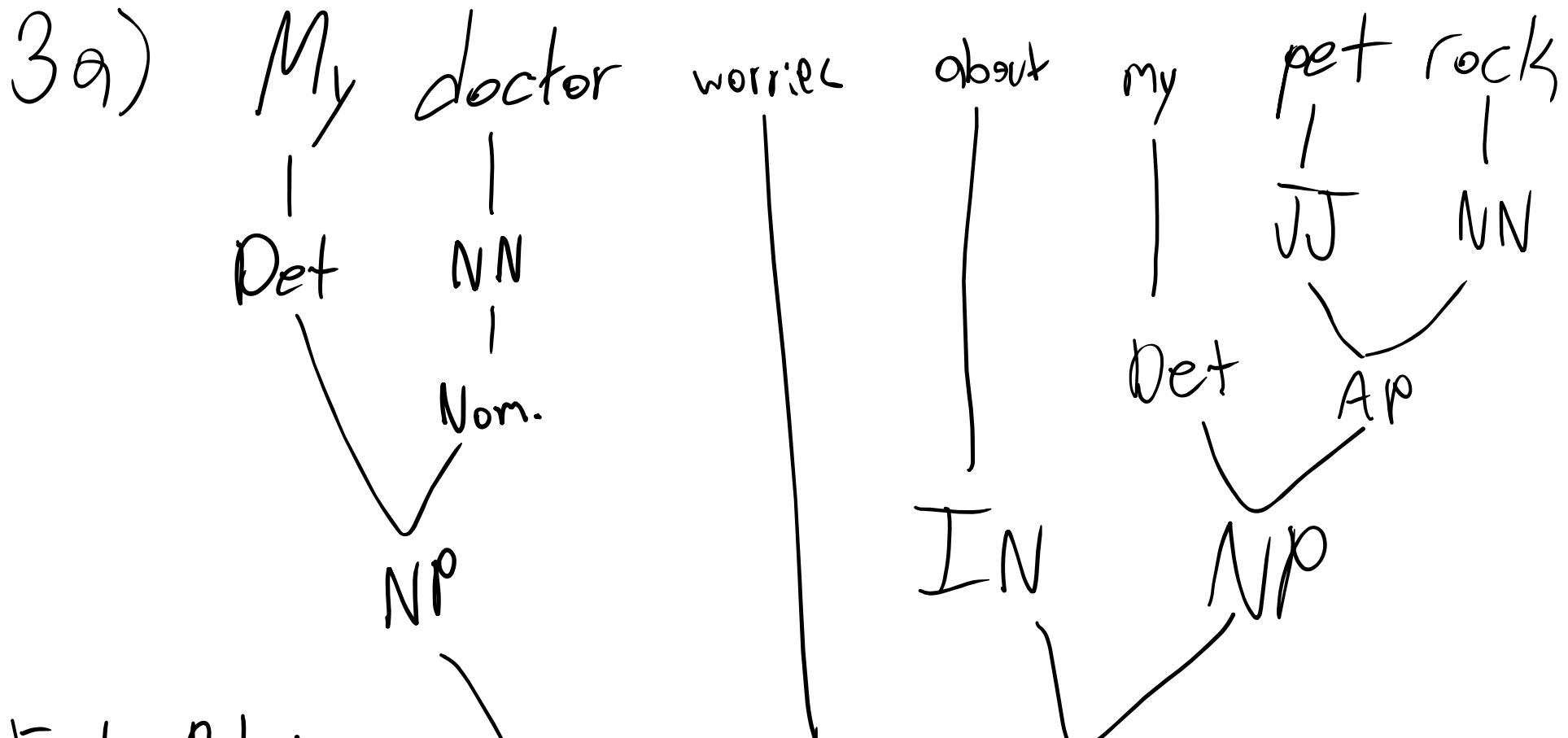
	DT	VBD	NN	JJ
n_1	$DT: 0.05 \times 0 \times 0.0075 = 0$	$VBD: 0.15 \times 0 \times 0.0075 = 0$	$NN: 0.3 \times 0.3 \times 0.0075 = 0.00675$	$JJ: 0.2 \times 0.05 \times 0.0075 = 0.00075$
-	$VBD: 0.001 \times 0 \times 0 = 0$	$0.002 \times 0 \times 0 = 0$	$0.02 \times 0.3 \times 0 = 0$	$0.005 \times 0.05 \times 0 = 0$
n_2	$NN: 0.35 \times 0 \times 0 = 0$	$0.04 \times 0 \times 0 = 0$	$0.005 \times 0.3 \times 0 = 0$	$0.002 \times 0.05 \times 0 = 0$
	$JJ: 0.002 \times 0 \times 0 = 0$	$0.2 \times 0 \times 0$	$0.2 \times 0.3 \times 0 = 0$	$0.01 \times 0.05 \times 0 = 0$
	Sum	0	0	0.00075

	DT	VBD	NN	JJ
n_2	$DT: 0.05 \times 0 \times 0 = 0$	$VBD: 0.15 \times 0.2 \times 0 = 0$	$NN: 0.3 \times 0 \times 0 = 0$	$JJ: 0.2 \times 0 \times 0 = 0$
-	$VBD: 0.001 \times 0 \times 0 = 0$	$0.002 \times 0.2 \times 0 = 0$	$0.02 \times 0 \times 0 = 0$	$0.005 \times 0 \times 0 = 0$
n_3	$NN: 0.35 \times 0 \times 0.00675 = 0$	$0.04 \times 0.2 \times 0.00675 = 0.000954$	$0.005 \times 0 \times 0.00675 = 0$	$0.002 \times 0 \times 0.00675 = 0$
	$JJ: 0.002 \times 0 \times 0.00075 = 0$	$0.2 \times 0.2 \times 0.00075 = 0.0003$	$0.2 \times 0 \times 0.00075 = 0$	$0.01 \times 0 \times 0.00075 = 0$
	Sum	0	0.000084	0

	DT	VBD	NN	JJ
n_3	$DT: 0.05 \times 0 \times 0 = 0$	$VBD: 0.15 \times 0 \times 0 = 0$	$NN: 0.3 \times 0.05 \times 0 = 0$	$JJ: 0.2 \times 0.3 \times 0 = 0$
-	$VBD: 0.001 \times 0 \times 0.000084 = 0$	$0.002 \times 0 \times 0.000084 = 0$	$0.02 \times 0.05 \times 0.000084 = 8.4 \times 10^{-8}$	$0.005 \times 0.3 \times 0.000084 = 1.26 \times 10^{-7}$
n_4	$NN: 0.35 \times 0 \times 0 = 0$	$0.04 \times 0 \times 0 = 0$	$0.005 \times 0.05 \times 0 = 0$	$0.002 \times 0.3 \times 0 = 0$
	$JJ: 0.002 \times 0 \times 0 = 0$	$0.2 \times 0 \times 0 = 0$	$0.2 \times 0.05 \times 0 = 0$	$0.01 \times 0.3 \times 0 = 0$
	Sum	0	8.4×10^{-8}	1.26×10^{-7}

2b.

$$P(O) = 8.4 \times 10^{-8} + 1.26 \times 10^{-7} = 2.1 \times 10^{-7}$$



Extra Rules:

$$S \rightarrow NP\ VP$$

$$P \rightarrow IN\ NP$$

$$AP \rightarrow JJ\ NN$$

Ambiguous since pet can be a noun.

3b) I would like to thanks you for your help

PRP
Verb
Verb
Verb
Adverb
Verb
NP
VP
VP
VP
VP
S

IN
PRP
NN
NP
PP
IN
NP
PRP
Verb
NP
VP
VP
VP
VP
VP
S

Extra Rules:

- $NP \rightarrow PRP$
- $PP \rightarrow IN\ NP$
- $PP \rightarrow Adverb\ VP$
- $PP \rightarrow PRP\ NN$
- $NP \rightarrow PRPPP$

Not ambiguous

Extra Rules:

$N^p \rightarrow pR\bar{p}$

$p\bar{p} \rightarrow IN Np$

pp → Adverb V P

$p\bar{p} \rightarrow p\bar{p} p\bar{p} NN$

$Np \rightarrow pRppp$