3) Maximum Entropy Modelling

a) for the given sequence ie to find for race

the previous tag is $t_{i-1} = TO$

$\Rightarrow x$

curr_word = race

Entropy $P(C|x) = \frac{1}{Z}\exp\left(\sum_i w_i f_i\right)$

∴ from the given information

		f_1	f_2	f_3	f_4	f_5	f_6	
VB	f	0	1	0	1	1	0	} product of these ($w_i f_i$)
VB	w	0	0.75	0	0.10	0.15	0	

$P($ ~~VB/x~~ $) =$ ~~0.75~~

		f_1	f_2	f_3	f_4	f_5	f_6	
NN	f	1	0	0	0	0	1	} Product of these with
NN	w	0.3	0	0.9	0	0	-0.2	

$\therefore P(VB|x) = \frac{e^{0.75}e^{0.10}e^{0.15}}{e^{0.75}e^{0.10}e^{0.15} + e^{0.3}e^{-0.2}} = \frac{e^1}{e^1+e^{0.1}} = 0.71$

$\therefore P(NN|x) = \frac{e^{0.3}e^{-0.2}}{e^1+e^{0.1}} = 0.289$

$\Rightarrow \therefore C = VB$ ✓

3-b)

race !?

curve word = race

previous tag = DT

		f_1	f_2	f_3	f_4	f_5	f_6
VB	f	0	0	0	1	1	0
VB	w	0	0.75	0	0.10	0.15	0

		f_1	f_2	f_3	f_4	f_5	f_6
NN	f	1	0	1	0	0	0
NN	w	0.3	0	0.9	0	0	-0.2

$$P(VB|x) = \frac{e^{0.10} e^{0.15}}{e^{0.10} e^{0.15} + e^{0.3} e^{0.9}}$$

$$= \frac{e^{0.25}}{e^{0.25} + e^{1.2}} = 0.28$$

$$P(NN|x) = \frac{e^{0.3} e^{0.9}}{e^{0.10} e^{0.15} + e^{0.3} e^{0.9}}$$

$$= \frac{e^{1.2}}{e^{0.25} + e^{1.2}} = 0.721$$

$\therefore$ C = NN