NLP ASSIGNMENT 3

3. a) Secretariat/NNP is/VBZ expected/VBN to/TO race/?? Tomorrow/NN

Tags	f_1	f_2	f_3	f_4	f_5	f_6
VB F	0	1	0	1	1	0
VB W	ϕ	0.75	ϕ	0.1	0.15	ϕ
NN F	1	0	0	0	0	1
NN w	0.3	ϕ	0.9	0	0	-0.2

$$P(VB|race) = \frac{e^{0.75}\ e^{0.1}\ e^{0.15}}{e^{0.3}e^{0.1}e^{0.15} + e^{0.3}e^{-0.2}} = \frac{2.7182}{3.8233} = 0.7109$$

$$P(NN|race) = \frac{e^{0.3}\ e^{-0.2}}{e^{0.75}e^{0.1}e^{0.15} + e^{0.3}e^{-0.2}} = \frac{1.1057}{3.8233} = 0.2890$$

$$\hat{C} = \underset{c \in C}{\text{argmax}}\ P(c|x)$$

$$= \text{argmax}\ (0.7109, 0.2890)$$

$$= 1^{st} \rightarrow 0.7109$$

$$= VB$$

∴ The best tag for 'race' is VB.

b. The /DT race/?? for /IN outer /JJ space /NN

Tags		f_1	f_2	f_3	f_4	f_5	f_6
VB	f	0	0	0	1	1	0
VB	w	ϕ	0.75	0	0.1	0.15	0
NN	f	1	0	1	0	0	0
NN	w	0.3	0	0.9	0	0	-0.2

$$P(VB/race) = \frac{e^{0.1} e^{0.15}}{e^{0.1} e^{0.15} + e^{0.3} e^{0.9}} = \frac{1.2840}{1.2840 + 3.3201} = 0.2788$$

$$P(NN/race) = \frac{e^{0.3} e^{0.9}}{e^{0.1} e^{0.15} + e^{0.3} e^{0.9}} = \frac{3.3201}{1.2840 + 3.3201} = 0.7211$$

$$\hat{C} = \underset{c \in C}{\text{argmax}}\, P(c/x)$$

$$= \text{argmax}\,(0.2788, 0.7211)$$

$$= 2^{nd} \rightarrow 0.7211$$

$$= NN$$

∴ The best tag for 'race' is NN.