Naïve Bayes Homework

Size (L, S)	Color (R,G,B)	Output (P,N)
L	R	P
S	B	P
S	B	N
L	R	N
L	B	P
L	G	N
S	B	P

For the given training set:

1. Create a table of the statistics needed to do Naïve Bayes
2. What would be the output for a new instance which is Small and Blue?
3. What is the Naïve Bayes value and the normalized probability for each output class (P or N) for this case of Small and Blue?

$$v_{NB} = \arg\max_{v_j \in V} P(v_j) \prod_i P(a_i \mid v_j)$$

What do we need?

Size (L, S)	Color (R,G,B)	Output (P,N)
L	R	P
S	B	P
S	B	N
L	R	N
L	B	P
L	G	N
S	B	P

$$v_{NB} = \arg\max_{v_j \in V} P(v_j) \prod_i P(a_i \mid v_j)$$

P(P)	4/7
P(N)	3/7
P(Size=L|P)	2/4
P(Size=S|P)	2/4
P(Size=L|N)	2/3
P(Size=S|N)	1/3
P(Color=R|P)	1/4
P(Color=G|P)	0/4
P(Color=B|P)	3/4
P(Color=R|N)	1/3
P(Color=G|N)	1/3
P(Color=B|N)	1/3

What is our output for a new instance which is Small and Blue?

v_P = P(P)* P(S|P)*P(B|P) = 4/7*2/4*3/4= .214

v_N = P(N)* P(S|N)*P(B|N) = 3/7*1/3*1/3= .048

Normalized Probabilites:
P= .214/(.214+.048) = .817

N = .048/(.214+.048) = .183