Assignment 4
Seong Kon Kim (sk1299)

a.2)
When you implement this calculation, a problem arise when the size gets very big. The conditional probability can approach zero when you start multiplying them together. Multiplying 10000(for example) probabilities together quickly results in a tiny number and can run out of precision for data type.

a.5)
This table contains basic and advanced features from 10% of data to 100% of data

k=0.001	basic	advanced
10%	0.737	0.737
20%	0.786	0.786
30%	0.801	0.786
40%	0.802	0.792
50%	0.811	0.801
60%	0.81	0.803
70%	0.809	0.806
80%	0.824	0.807
90%	0.823	0.805
100%	0.825	0.806
AVERAGE	**0.8028**	**0.7929**

a.6)
The k value we chose was 0.0001 for the laplace smoothing algorithm. Our classifier determine getting the probability of each pixel and sum of pixel depending on the number of data used. The higher the sum, the better the chance of being correct prediction. The result is much higher than i expected but with more data to train, it will definitely result better accuracy.

	basic	advanced
k=0.00001	0.825	0.806
k=0.0001	**0.825**	**0.806**

k=0.001	0.821	0.806
k= 0.01	0.818	0.803
k=0.1	0.817	0.801
k=1	0.816	0.801
k= 10	0.805	0.796
k=100	0.671	0.687
k=500	0.294	0.261

b.1)
Features1:

Instead of counting both # and +, I only counted interior (# or 1) to find the value.By looking at the data, it seems that the edges can cause a lot of misleads. I got accuracy of 0.799

Features2:

This feature is to scan noises and remove them so that the image has more accuracy in calculation. I got accuracy of 0.818

Features3:

In this feature, I used 0,1 and 2 instead of binary to see if it changes the accuracy. It was a bit higher than i thought. I got accuracy of 0.819

b.2)
In effort to combine basic and advanced features together, I could not seem to find the reason why the accuracy got lower