Naive Bayes Exercise

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1 Naive Bayes for Play or no play

Table 1: Data

Outlook	**Temp.**	**Humidity**	**Windy**	**Play**
sunny	85	85	false	No
sunny	80	90	true	No
overcast	83	78	false	Yes
rain	70	96	false	Yes
rain	68	80	false	Yes
rain	65	70	false	Yes
overcast	64	65	true	Yes
sunny	72	95	false	No
sunny	69	70	false	Yes
rain	75	80	false	Yes
sunny	75	70	true	Yes
overcast	72	90	true	Yes
overcast	81	75	false	Yes
rain	71	80	true	No

Using the above training data set, build a Naive Bayes classifier to classify the following new instance:

$$\mathbf{X} = \{Outlook = sunny, Temp = 70, Humidity = 65, Windy = true\}$$

You may discretize the continuous variables any way you wish.
Naive bayes classifier is defined as:

$$P(Y|\mathbf{X}) \propto P(Y) \prod_i P\left(X_i|Y\right)$$

2 Naïve Bayes for binary variables

Consider the training and testing data in the Table below. Classify the test records in Table b using the Naïve Bayes classifier trained on the training data

in Table a. You only need to compute the probabilities you will need for the classification. For your answer, you need to tell which class has the highest posterior probability – you do not have to compute the final posteriors as long as it is clear which one is bigger.

X	Y	Z	Class
1	1	1	+
1	0	0	−
1	1	1	+
1	1	0	+
1	1	1	−
1	1	0	−
0	1	1	−
0	1	1	+
0	0	1	+
0	0	0	+

Consider the test following test data:

1. X = 0, Y = 1, Z = 0
2. X = 1, Y = 0, Z = 1

Predict the class for the above two instances.