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Self Check 12

1. Data Probability Table

	Yes				No			
	Round		Square		Round		Square	
	Large	Small	Large	Small	Large	Small	Large	Small
Blue	0.000	0.000	0.000	0.000	0.067	0.067	0.000	0.067
Green	0.067	0.000	0.200	0.000	0.000	0.067	0.000	0.067
Red	0.133	0.067	0.000	0.000	0.000	0.000	0.067	0.133

We can use this data to construct the Bayesian Probability Table:

P(Yes)	0.467
P(No)	0.533
P(Round|Yes)	0.571
P(Round|No)	0.375
P(Square|Yes)	0.429
P(Square|No)	0.625
P(Large|Yes)	0.85714286
P(Large|No)	0.25
P(Small|Yes)	0.14285714
P(Small|No)	0.75
P(Blue|Yes)	0
P(Blue|No)	0.375
P(Green|Yes)	0.57142857
P(Green|No)	0.25
P(Red|Yes)	0.42857143
P(Red|No)	0.375

2. Assuming that the features are all mutually exclusive, we can calculate the normalize probability distribution of Square Large Red. We have the following formula:

   P(YES, Square, Large, Red) = P(YES | Square, Large, Red) * P(Square | Large, Red) * P(Large | Red) * P(Red)

   Expanding, and then simplifying it using Bayes' Formula, we are left with:

   P(YES, Square, Large, Red) = P(YES | Square, Large, Red) * P(Square, Large, Red)

Rearranging the terms, we then have:

P(YES | Square, Large, Red) = P(YES, Square, Large, Red) / P(Square, Large, Red)

and its counterpart:

P(No | Square, Large, Red) = P(No, Square, Large, Red) / P(Square, Large, Red)

From the above data:
P(YES, Square, Large, Red): 0
P(NO, Square, Large, Red): 0.067
P(Square, Large, Red): 0.067

Normalizing the probability
P(YES | Square, Large, Red): 0 / 0.067 = 0
P(NO | Square, Large, Red) : 0.067 / 0.067 = 1

Given the provided data, the model would predict that Square Large Red would NOT be safe.