3. This question is concerned with the **Naïve Bayes** classifier.

   a) Write down the **Bayes' theorem** and explain briefly what it means. (5 marks)

   b) Refer to the data contained in the following table:

Magazine Promotion	**Watch Promotion**	**Credit Card Insurance**	**Sex**	**Life Insurance Promotion**
Yes	No	No	Male	No
Yes	Yes	Yes	Female	Yes
No	No	No	Male	Yes
Yes	Yes	Yes	Male	Yes
Yes	No	No	Female	Yes
No	No	No	Female	No
Yes	Yes	Yes	Male	Yes
No	No	No	Male	No
Yes	No	Yes	Male	No
Yes	Yes	No	Female	No

Copy the table presented below to your answer book. Fill in the counts and probabilities in the table. The output attribute is '*life insurance promotion*'. (5 marks)

	Magazine Promotion		Watch Promotion		Credit Card Insurance		Sex	
Life Insurance Promotion	Yes	No	Yes	No	Yes	No	Male	Female
Counts								
Yes								
No								
Probabilities								
Yes								
No								

(question continues on next page. . .)

(Question 3 continued. . .)

c) Use the completed table in Part (b) together with the Naïve Bayes classifier to determine the value of life insurance promotion for the following instance:

Magazine Promotion = Yes
Watch Promotion = Yes
Credit Card Insurance = Yes
Sex = Female
Life Insurance Promotion = ?

(9 marks)

d) Repeat Part (c), but assume that the gender of the customer is unknown.

(4 marks)

e) Comment on the results obtained in Part (c) and Part (d). (2 marks)