a)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Count of Online** | **Column Labels** |  |  |  |
| **Row Labels** | **0** | **1** | **(blank)** | **Grand Total** |
| **0** | **1112** | **1614** |  | **2726** |
| 0 | 789 | 1140 |  | 1929 |
| 1 | 323 | 474 |  | 797 |
| **1** | **104** | **170** |  | **274** |
| 0 | 72 | 117 |  | 189 |
| 1 | 32 | 53 |  | 85 |
| **(blank)** |  |  |  |  |
| **Grand Total** | **1216** | **1784** |  | **3000** |

b) There are 170 records where online = 1 and cc = 1. 53 of them accept the loan. Therefore, the conditional probability is 53/170 = 0.311

c)

|  |  |  |  |
| --- | --- | --- | --- |
| **Count of ID** | **Column Labels** |  |  |
| **Row Labels** | **0** | **1** | **Grand Total** |
| **0** | 1197 | 1803 | 3000 |
| 0 | 1090 | 1624 | 1932 |
| 1 | 107 | 179 | 200 |
| **1** |  |  |  |
| 0 | 321 | 461 | 782 |
| 1 | 36 | 50 | 86 |
| **Grand Total** |  |  | **3000** |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Count of ID** | **Column Labels** |  |  |
| **Row Labels** | **0** | **1** | **Grand Total** |
| **0** |  |  |  |
| 0 | 1932 | 782 | 2714 |
| 1 | 200 | 86 | 286 |
| **Grand Total** | 2312 | 868 | **3000** |

d)

I. P (CC = 1|Loan = 1) (the proportion of credit card holders among the loan acceptors) = 86/286 = 0.301

II. P (Online = 1|Loan = 1) = 179/286 = 0.626

III. P (Loan = 1) (the proportion of loan acceptors) =286/3000 = 0.095

IV. P (CC = 1|Loan = 0) = 782/2714 =0.288

V. P (Online = 1|Loan = 0) =1624/2714 = 0.598

VI. P (Loan = 0) = 2714/3000 = 0.905

e)

P( Loan = 1| CC = 1; Online = 1)

= (0.301 \* 0.626 \* 0.095)/ [(0.30 \* 0.626 \* 0.095) + (0.288 \* 0.598 \* 0.905)]

= 0.0179/(0.0179+0.156)

= 0.0179/0.1738

= 0.103

f)

The value obtained from the crossed pivot table is the more accurat e estimate, since it does not make the simplifying assumption that the probabilities are independent. It is feasible in this case because there are few variables and few categories to consider, and thus there are ample data for all possible combinations.