1. **Yes**, this table summarizes quantitative data because the data is summarized in quantitative numbers according to which level of quality importance the customer picks.

2.

Importance of Quality	**Relative Frequency**
Extremely Important	(0.077 + 0.034)/1.002 = **0.111**
Very Important	(0.210 + 0.039)/1.002 = **0.249**
Important	(0.193 + 0.028)/1.002 = **0.221**
Somewhat Important	(0.227 + 0.017)/1.002 = **0.244**
Not Very Important	(0.116 + 0.006)/1.002 = **0.122**
Not Important At All	(0.055 + 0.000)/1.002 = **0.055**
Total	**1.000**

3. The probability that a random customer is a "casual customer " is **0.876**.
   Let C = Casual Customers
   P [C] = 0.878/1.002
   = 0.876

4. **17.7%** of customers' answers fall into the low importance category.
   Let L = Low importance category
   P [L] = 0.177/1.002
   = 0.177

5. Casual and Loyal customer are disjoint events because they are mutually excusive, in other words, they cannot occur at the same time.
   Let C represent Casual Customers
   Let L represent Loyal Customers
   Let LI represent Low Importance

   P[C and LI] = P[C] x P[LI]
   P[C and LI] = 0.171/ 1.002
   = 0.171

   P[C] x P[LI] = (0.878/1.002) x (0.177/1.002)
   = 0.155

   P[L and LI] = P[L] x P[LI]
   P[L and LI] = 0.006 / 1.002
   =0.006

   P[L] x P[LI] = (0.124 / 1.002) x (0.177 / 1.002)
   =0.022

Therefore P[C and LI] ≠ P[C] x P[LI] and P[L and LI] ≠ P[L] x P[LI]

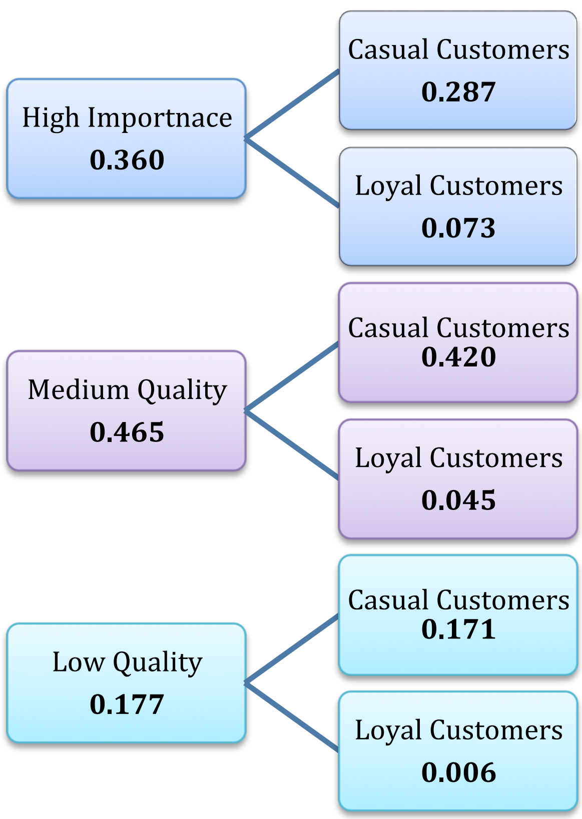
6. We will use the **simple addition rule** to regroup the quality categories into low/medium/high.

7.

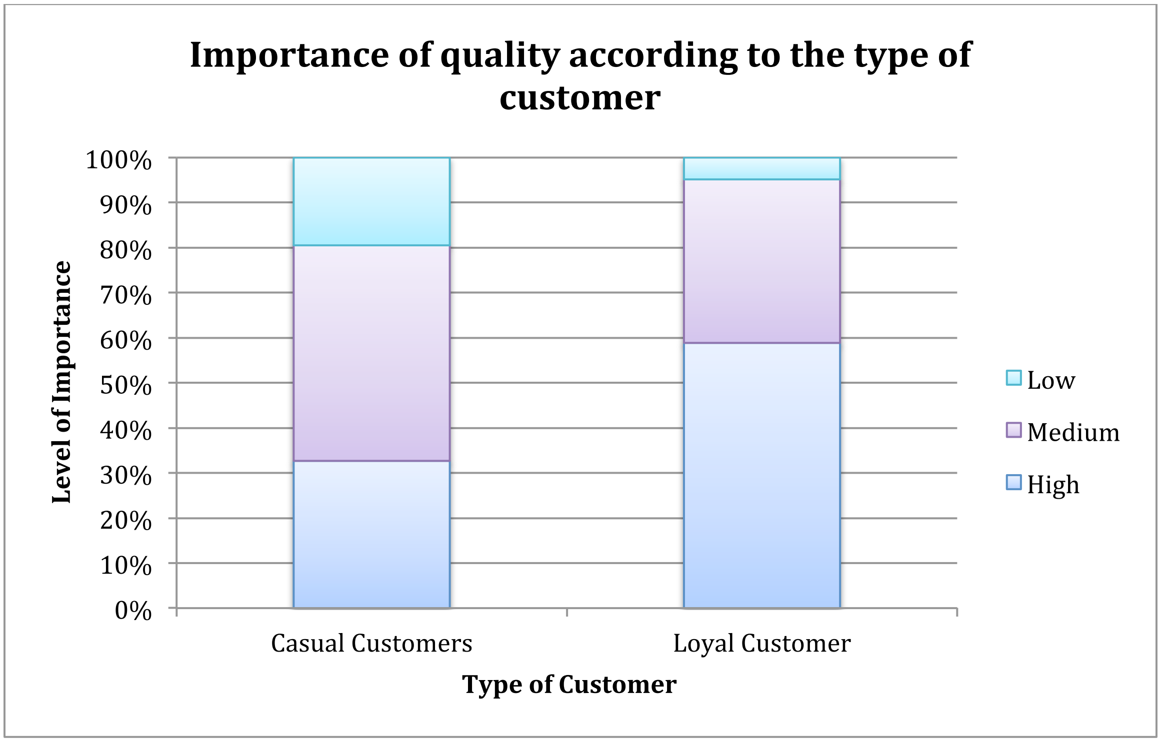
Importance of Quality	Casual customers	Loyal customers	Total
High	0.077 + 0.210 =**0.287**	0.034 + 0.039 =**0.073**	0.287 + 0.073 =**0.360**
Medium	0.193 + 0.227 =**0.420**	0.028 + 0.017 =**0.045**	0.420 + 0.045 =**0.465**
Low	0.116 + 0.055 =**0.171**	0.006 + 0.000 =**0.006**	0.171 + 0.006 =**0.177**
Total	0.287 + 0.420 + 0.171 =**0.878**	0.073 + 0.045 + 0.006 =**0.124**	**1.002**

As seen in class, probability must be between 0 and I inclusive. A probability of 0 indicates it is impossible, while 1 indicates certainty. In this problem we can see the "Total" amount adds up to 1.002, this could have been cause by rounding error.

8.



9.



In this chart each bar represents the distribution of importance of quality according to the type of customer. We can see that the distributions of importance are very different depending on the type of customer. Loyal Customers tend to have higher importance of quality in comparison to Casual Customers.

10. The marginal probability of customers rating quality as of "low importance" is **17.66%** . The marginal probability of a customer being a loyal customer is **12.38%**.

11. I do not agree with this statement, as we can see in the chart above (question 9) over 50% of loyal customer believe high quality is important creating a big difference between low and high quality importance. On the other hand, we can see casual customers tend to display their importance more consistently.

12. There is a **0.589** probability that the first customer who comes to the cash uses a loyalty card and considers quality to be of high importance.
   Let LC represent customer who uses loyalty card
   Let HI represent High Importance
   P[HI | LC] = P (HI and LC) / P (LC)

= 0.073 / 0.124
= 0.589

13. There is a **0.411** probability that the first customer who comes to the cash uses a loyalty card and does not considers quality to be of high importance.
Let LC represent customer who uses loyalty card
Let HI represent High Importance
1 - P[HI | LC]
= 1 – 0.589
= 0.411

14. There is a **0.118** probability that quality is not of high importance, but of low importance instead.
Let LC represent customer who uses loyalty card
Let LI represent Low Importance
Let HI represent High Importance
P[LI|LC]/ [Not HI |LC]
= 0.006/ (0.045 + 0.006)
= 0.006/ 0.051
=0.118

15. There is a **0.195** possibility that the casual customer will consider quality to be of low importance.
Let C represent casual customer
Let LI represent Low Importance
P[LI |C]/P[C]
= 0.171/ 0.878
= 0.195

16. The is a **0.988** probability that at least one of the loyal customers falls in the high quality importance category.
Let LC represent loyalty customers
Let HI represent High Importance

There is only one possibility where there is not at least one high importance customer, which is when all five believe high quality is not important. To find this I found the probability a quality not being high importance for a loyal customer:
P[Not HI | LC]=[0.045 + 0.006]/ 0.124
= 0.411

To find the probability of the 5 loyal customers *not* believing high quality is important I multiplies the results of P[Not HI | LC] by 5.
P[Not HI | LC]^5= (0.411) ^{5}
= 0.012

To find the probability of at least one of the loyal customers believe high quality is important I did:
1 – P[Not HI | LC] = 1 – 0.012

= 0.988

17. If the manager is correct, the best way to represent the different age category we could create subcategories under the customer type.

Importance of Quality	20 -30 years		40-50 years	
	Casual Customers	Loyal Customers	Casual Customers	Loyal Customers
High				
Medium				
Low				
Total				