- 1. (a) 1/3
 - (b) The probability that the prize was not behind door 1 is 1-1/3 = 2/3.

For further explanation, consider the situation. There was one chance in three that the prize is behind door number 1. Whether the prize is or is not behind door number 1, Monty will open one of the other two doors. That has not changed anything; we expected that he would. The chance is still one in three that you originally guessed the correct door to the prize.

(c) He should definitely switch. He gets the benefit of winning when the prize was originally behind door number 2 or door number 3.

If you do not switch, the event of your winning a prize is the event that the prize was behind the door you originally selected. (This has chance of 1/3.) If you switch doors, the event of your winning a prize is now the event that the prize was not behind the door you originally selected. (Since it is the opposite of the earlier-mentioned event, its chance is 1 - 1/3 or 2/3.)

The reason that we can say that when you switch doors, you now depend on the opposite event is because whenver you did not correctly guess the correct originally and you then switch, you are sure to win. There is only one other door left; the one that Monty opened cannot have the prize. By opening a door without the prize, Monty has in effect given you the the benefits of having selected the correct door for the prize, no matter which one of the two—other than the one you selected—was the correct one.

As an additional explanation, think what will happen on the average for every six times that you play the game. Twice door number 1 will be correct. One of those two times Monty will open door number 2 and one of those two times Monty will open door number 3. Twice door number 2 will be correct and Monty will open door number 3. Twice door number 3 will be correct and Monty will open door number 2.

That means that on the average Monty will open door number 2 three times out of the six, once when door number 1 is correct and twice when door number 3 is correct. It is twice as likely that door number 3 is the correct door; to maximize your chances it is strongly recommended that you switch (unless you have ESP or you peeked).