Assignment 1
Edward Cao - 100697845

1 a)

I. There are a total of 7 doors that are neither hot nor noisy but safe. To calculate the probability of this, we would divide the amount of doors with these properties by the total number of doors which is 7/80. Therefore the probability of a door being neither hot nor noisy and safe is 0.0875 or 8.75%

II. There are a total of 19 doors that are not hot or safe. To calculate the probability of this, we divide the amount of doors with these properties by the total number of doors which is 19/80. Therefore the probability of a door being not hot or safe is about 0.238 or 23.8%

III. There are a total of 29 doors that are not noisy. To calculate the probability of a noisy door being hot, we divide the amount of doors with these properties by the total number of doors which is 13/29. Therefore the probability of a not noisy door being hot is about 0.448 or 44.8%

1 b)
To calculate whether a property is independent of another, we must check the probability of a property with and without the presence of the other. P(A|B) = P(A) and P(B|A) = P(A). For hot, the probability of a door being hot is 41/80 = 0.513 and the probability of a noisy door being hot is 28/51 = 0.549.

For noisy, the probability of a door being noisy is 51/80 = 0.637 and the probability of a hot door being noisy is 28/41 = 0.683

Since the probabilities of one property do not equal the probability of that property given the other property, we can assume that the properties of noisy and hot are dependent on each other.

1 c)
There are a total of 29 doors that are safe and noisy. To calculate the probability of this, we divide the amount of doors with these properties by the total number of doors which is 29/80. Therefore the probability of a door being safe and noisy is about 0.363 or 36.3%

1 d)
There are a total of 21 doors that are safe and hot. To calculate the probability of a safe door being hot, we divide the amount of safe doors with this property against the total number of safe doors which is 21/41. Therefore the probability of a safe door being hot is about 0.512 or 51.2%

1 e)

There are a total of 23 doors that are noisy but not hot. Out of the 23 doors, 13 are safe and 10 are not. By dividing the number of safe doors against the total number of doors which is 13/23, the probability of a noisy but not hot door being safe is 0.565 or 56.5%. Since the odds of the door being safe are greater than the odds of the door being unsafe, I would open the door assuming there were no other or better options.