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Hot	Noisy	Safe Door	Number of Doors	
Y	Y	Y	10	0.125
Y	Y	N	12	0.15
Y	N	Y	5	0.0625
Y	N	N	8	0.1
N	Y	Y	13	0.1625
N	Y	N	22	0.275
N	N	Y	1	0.0125
N	N	N	9	0.1125
			80	

A)

i) Pr (Hot = N, Noisy = N, Safe = Y)

0.0125, or 1.25%

ii) Pr (Hot = N, Safe = N)

0.275 + 0.1125 = 0.3875, or 38.75%

iii) Pr (Hot=Y | Noisy = N)

0.0625 + 0.1 = 0.1625, or 16.25%

B) Pr (Hot = Y | Noisy = Y) = 0.125 + 0.15 = 0.275

Pr (Hot = Y) = 0.125 + 0.15 + 0.0625 + 0.1 = 0.4375

Pr (Noisy = Y | Hot = Y) = 0.125 + 0.15 = 0.275

Pr (Noisy = Y) = 0.125 + 0.15 + 0.1625 + 0.275 = 0.7125

Logically, the two properties should have been independent. Whether or not a door is noisy does not affect whether the door is hot. **However,** the independence event formula of Pr(A|B) = Pr(A) does not hold true with the above data, leading to the mathematical conclusion that the doors being hot and the doors being noisy **are not independent variables.**

C) Pr (Safe = Y, Noisy = Y)

0.125 + 0.1625 = 0.2875, or 28.75%

D)

Hot	Noisy	Safe Door	Number of Doors	

Y	Y	Y	10	0.3448275862
Y	N	Y	5	0.1724137931
N	Y	Y	13	0.4482758621
N	N	Y	1	0.03448275862
			29	

Pr (Hot = Y)
0.45 + 0.03 = 0.48, or 48%.

E)

Hot	Noisy	Safe Door	Number of Doors	
N	Y	Y	13	0.37142857142
N	Y	N	22	0.62857142857
			35	

Pr (Safe = Y)
Based on this data, using only the situations where the doors are not hot and are noisy, the door should only be opened if it is more likely to be safe than not safe. There is a 37% chance that the door is safe, but a 62% chance it is not. Therefore, we should not open the door.