1. A crime is committed by one of two suspects, A and B. Initially, there is equal evidence against both of them. In further investigation at the crime scene, it is found that the guilty party had a blood type found in 10% of the population. Suspect A does match this blood type, whereas the blood type of Suspect B is unknown. (a) Given this new information, what is the probability that A is the guilty party? (b) Given this new information, what is the probability that B’s blood type matches that found at the crime scene?

A: Let the blood type found at crime seen be X.

Probability that A is gulity **prior** to the new evidence P(A)=1−P(B)=0.5P(A)=1−P(B)=0.5

Probability that blood type of X is found **given** A is gulty = Probability that A has the blood type P(X|A)=1P(X|A)=1

Probability that blood type of X is found **given** B is guilty = Probability that B has the blood type P(X|B)=0.1P(X|B)=0.1

Now it is known that blood type is X, and given exactly one of A or B is guilty,

P(A|X)=P(X|A)P(A)P(X)=P(X|A)P(A)P(X|A)P(A)+P(X|B)P(B)=10/11