**STATISTICS ASSIGNMENT-8**

Q1. 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?

**Answer:**

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)=0.5

Probability that blood type of X is found **given** A is gulty = Probability that A has the blood type P(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)=0.1

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

By Bayes' Rule, B's probability of having blood type X =  1/10

1/10+9/10∗1/2

=2/11.

Plugging that into your equation, we have A's probability of guilt.

= 2/11∗1/2+9/11

=10/11.