**STATISTICS ASSIGNMENT\_8**

**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 G be the event that Suspect A is the guilty party, and B be the event that the blood type found at the crime scene matches the blood type of the guilty party.

Using Bayes' theorem, P(G | B) = P(B | G) \* P(G) / (P(B | G) \* P(G) + P(B | G') \* P(G')), where P(G) = 0.5 is the prior probability that Suspect A is the guilty party, P(B | G) = 0.1 is the probability that the blood type found at the crime scene matches Suspect A's blood type given that Suspect A is the guilty party, and P(B | G') = ? is the probability that the blood type found at the crime scene matches Suspect B's blood type given that Suspect B is the guilty party.

Since the blood type of Suspect B is unknown, we cannot calculate the probability P(B | G'). So we can't find P(G | B).

(b) Let X be the event that Suspect B's blood type matches the blood type found at the crime scene.

Using Bayes' theorem, P(X | B) = P(B | X) \* P(X) / (P(B | X) \* P(X) + P(B | X') \* P(X')), where P(X) = 0.5 is the prior probability that Suspect B's blood type matches the blood type found at the crime scene, P(B | X) = 0.1 is the probability that the blood type found at the crime scene matches Suspect B's blood type given that Suspect B's blood type matches the blood type found at the crime scene, and P(B | X') = 1 is the probability that the blood type found at the crime scene matches the blood type found at the crime scene given that Suspect B's blood type does not match the blood type found at the crime scene.

So, P(X | B) = 0.1 \* 0.5 / (0.1 \* 0.5 + 1 \* 0.5) = 0.05.

The probability that Suspect B's blood type matches the blood type found at the crime scene given the new information is 0.05.