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?

**Ans:** (a) Let M be the event that A’s blood type matches the guilty party’s and for

brevity, write A for “A is guilty” and B for “B is guilty”. By Bayes’ Rule,

P (A|M ) = P (M |A)P (A)/(P (M |A)P (A) + P (M |B)P (B)) = 1/2/(1/2 + (1 /10)(1/2)) = 10/11

(b) Let C be the event that B’s blood type matches, and condition on whether B

is guilty. This gives

P (C|M ) = P (C|M, A)P (A|M ) + P (C|M, B)P (B|M ) = 1/10 \*10/11 + 1/11 = 2/11