1. **Give an example of 3 events A, B, C which are pairwise independent but not independent. Hint: find an example where whether C occurs is completely determined if we know whether A occurred and whether B occurred, but completely undetermined if we know only one of these things.**

Ans- Let A, B, and C be events defined as follows:

A: A fair coin lands heads up

B: A fair die lands on an even number

C: The sum of the numbers on the coin and die is odd

It can be shown that A and B are independent, B and C are independent, and A and C are independent. However, A, B, and C are not independent. To see why, note that if we know both A and B, we can determine whether C occurs: if A and B both occur, then C does not occur; otherwise, C does occur. However, if we know only one of A or B, we cannot determine whether C occurs.

1. **A bag contains one marble which is either green or blue, with equal probabilities. A green marble is put in the bag (so there are 2 marbles now), and then a random marble is taken out. The marble taken out is green. What is the probability that the remaining marble is also green?**

Ans- Let G1 be the event that the first marble drawn is green, and let G2 be the event that the second marble drawn is green. We want to find P(G2 | G1), the probability that the second marble drawn is green given that the first marble drawn is green.

By Bayes' theorem, we have:

P(G2 | G1) = P(G1 | G2) × P(G2) / P(G1)

Since there are two marbles in the bag and one of them is green, the probability that the first marble drawn is green is 1/2. Since the second marble is drawn randomly, the probability that it is green is also 1/2. Therefore:

P(G2 | G1) = P(G1 | G2) × P(G2) / P(G1) = 1 × 1/2 / (1/2) = 1

So ,the probability that the remaining marble is also green, given that the first marble drawn is green, is 1 (i.e., certain).