**STATICS ASSIGNMENT\_5**

**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.**

An example of 3 events A, B, and C that are pairwise independent but not independent is:

A: "rolling a 6 on a fair die"

B: "rolling an odd number on a fair die"

C: "rolling a 6 on a fair die given that an odd number was rolled"

A and B are independent events because the outcome of rolling a 6 on a fair die is not affected by whether an odd number was rolled, and vice versa. B and C are also independent events because the outcome of rolling an odd number on a fair die is not affected by whether a 6 was rolled given that an odd number was rolled.

However, A, B, and C are not independent events because the occurrence of C is completely determined if we know whether A and B occurred. If we know that a 6 was rolled (A) and an odd number was rolled (B), then it follows that a 6 was rolled given that an odd number was rolled (C).

The occurrence of C is completely undetermined if we know only one of these things. For example, if we know that a 6 was rolled (A), but do not know whether an odd number was rolled (B), then the occurrence of C is not determined.

**2. 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?**

Let G1 represent the event that the first marble drawn from the bag is green, and G2 represent the event that the second marble drawn from the bag is green.

Before the first marble is added to the bag, there is a 1/2 probability that the marble in the bag is green, and a 1/2 probability that it is blue. After the green marble is added to the bag, there is a 2/3 probability that a green marble will be drawn (since there are two green marbles and one blue marble), and a 1/3 probability that a blue marble will be drawn.

Given that a green marble was drawn (G1), the probability that the remaining marble is also green is P(G2 | G1) = P(G2 and G1) / P(G1) = P(G2) / P(G1) = 2/3 / 2/3 = 1, since P(G2) = 2/3 and P(G1) = 2/3.

So, the probability that the remaining marble is green, given that a green marble was drawn, is 1.