**Q.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.

**Solution: -**

Consider two fair, independent coin tosses, and let A be the event that the first toss is Heads, B be the event that the second toss is Heads, and C be the event that the two tosses have the same result. Then A, B, C are dependent since P(ABC) = P(AB) = P(A)P(B)=1/4 1/8 = P(A)P(B)P(C), but they are pairwise independent: A and B are independent by definition; A and C are independent since P(AC) = P(AB)=1/4 = P(A)P(C), and similarly B and C are independent.

**Q.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?

**Solution: -**

Let E1 and E2 and be the events that marble is green and blue respectively in the bag. Let A be the event of picking up a green marble

Then P(E1) =P(E2) =1/2, P(A/E1) =1, P(A/E2) =1/2

Now, if the marble taken out is green, then probability that remaining marble is also green is P(E1/A)

P(E1/A) =P(E1) P(A/E1)/P(E1) P(A/E1) +P(E2) P(A/E2)

