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.

We throw two dice. Let A be the event “the sum of the points is 7”, B the event “die #1

came up 3”, and C the event “die #2 came up 4”. Now, P[A] = P[B] = P[C] = 1/6.

Also,

P[A ∩ B] = P[A ∩ C] = P[B ∩ C] = 1/36

so that all events are pairwise independent. However,

P[A ∩ B ∩ C] = P[B ∩ C] = 1/36

while

P[A]P[B]P[C] = 1/216

so they are not independent as a triplet.

First, note that, indeed, P[A ∩ B] = P[B ∩ C] = 1/36, since the fact that A and B occurred is the same as the fact that B and C occurred.

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 G represents green marble and B represents Blue marble. According to the question. After putting a green marble in the bag, we have Let already present marble in the bag is green. Then, after taking green marble. Probability that the remaining marble is also green =1 Let already present marble in the bag is blue, then after taking green marble. Probability that the remaining marble is also green = 0 So, required probability =0+1=1