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.**

Answer:

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".

$P(A) = P(B) = P(C) = \frac{1}{6}$

Also, $P(A \cap B) = P(A \cap C) = P(B \cap C) = \frac{1}{36}$

so that all events are pairwise independent. However,

$P(A)P(B)P(C) = \frac{1}{216}$

so, they are not independent as a triplet.

First, note that, indeed, $P(A \cap B) = P(B \cap C) = \frac{1}{36}$, since the fact that A and B occurred is the same as the fact that B and C occurred.

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?**

Answer:

Let G : represents Green Marble

B: represents blue marble.

Suppose already green marble was in bag and after putting a green marble, hence 2 green marbles are in bag, after picking one green marble from bag the probability of remaining marble is also green =1.

Suppose already blue marble was in bag and after putting a green marble, hence 1 green marble and 1 blue are in bag, after picking one green marble from bag the probability of remaining marble is also green =0

Hence required probability = 0+1 = 1