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:**

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(A ∩ B ∩ C) = P(A ∩ B) = P(A)P(B)=1/4 6= 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(A ∩ C) = P(A ∩ B)=1/4 = P(A)P(C), and similarly B and C are independent.

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?

**Answer is 2/3**