1. Is it possible that an event is independent of itself? If so, when?

**Answer:**

Yes, It is possible that an event is independent of itself. And the only independent events of itself are those with probability either 0 or 1, and the way that a random variable X can be independent of itself is if for every measurable set A, that is, either Probability(X€A)=1 or Probability(X€A)=0.

2. Is it always true that if A and B are independent events, then Ac and Bc are independent

events? Show that it is, or give a counterexample.

**Answer:**

Given: A and B are independent events so, P(A∩B) =P(A).P(B)

P(Ac ∩Bc) = cP(A U B)

P(Ac ∩ Bc) = 1- P(A U B)

P(Ac ∩ Bc) = 1-[P(A) + P(B) - P(A∩B)]

P(Ac ∩ Bc) = 1-[P(A) + P(B) - P(A).P(B) ] by, P(A ∩ B) = P(A).P(B)

P(Ac ∩ Bc) = 1 - [1- P(Ac) + 1 - P(Bc) - ((1- P(Ac))(1 - P(Bc)))]

P(Ac ∩ Bc) = 1 - [2 - P(Ac) - P(Bc) - 1 + P(Bc) + P(Ac) - P(Ac).P(Bc)]

P(Ac ∩Bc) = 1 - [1 - P(Ac).P(Bc)]P(Ac ∩Bc)

P(Ac ∩ Bc) = P(Ac).P(Bc)

Therefore, Ac and Bc are also independent events.