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

**Ans : The only events that are independent of themselves are those with probability either 0 or 1. That follows from the fact that a number is its own square if and only if it's either 0 or 1. The only way a random variable X can be independent of itself is if for every measurable set A, either Pr(X∈A)=1 or Pr(X∈A)=0.**

1. 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.

**Ans : Given:**

**P(A # B) = P(A).P(B)**

**Prove:**

**P(Ac # Bc) = P(Ac).P(Bc)**

**Demorgon's LAw:**

**P(Ac # Bc) = cP(A U B) THIS IS WHOLE COMPLIMENT OF UNION**

**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) ] BECAUSE 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).P(Bc)**