**STATISTICS ASSIGNMENT 4**

**Question 1:**

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

**Solution:**

The only events that are independent of themselves are those with probability either 0 or 1.

Because, 02 =0 and 12 =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.

**Question 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.

**Solution:**

Assume A and B are independent. Then

=

=1− 𝑃(𝐴∪𝐵)

=1− 𝑃(𝐴) − 𝑃(𝐵) + 𝑃(𝐴∩𝐵)

=1− 𝑃(𝐴) − 𝑃(𝐵) + 𝑃(𝐴)𝑃(𝐵)

=(1−𝑃(𝐴)) (1−𝑃(𝐵))

=𝑃(A^c) 𝑃(B^c) P(A^c∩ B^c)

=1− P(A∪B)

=1− P(A) − P(B) + P(A∩B)

=1− P(A) − P(B) + P(A)P(B)

=(1−P(A)) (1−P(B))

=P(A^c) P(B^c)