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

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.

Assume AA and BB are independent. Then

P(Ac∩Bc)=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(Ac)P(Bc).