Statistics Assignment 4

1. Let A be an event. If A is independent of itself, then
$$P(A) = P(A \cap A) = P(A)^2$$
So, P(A) is 0 or 1. So this is only possible in the extreme cases that the event has probability 0 or 1.

2. Yes, because we have
$$P(A^c \cap B^c) = 1 - P(A \cup B) = 1 - \big(P(A) + P(B) - P(A \cap B)\big)$$
since A and B are independent, this becomes
$$1 - P(A) - P(B) + P(A)P(B) = \big(1 - P(A)\big)\big(1 - P(B)\big) = P(A^c)P(B^c).$$