Indian Institute of Space Science and Technology
AVD613 - Assignment 2
Department of Avionics

Assignment 2

Question 1 (From Bruce Hajek's book): Suppose $B_1, B_2, \ldots$ is a sequence of events in a probability space $(\Omega, \mathcal{F}, \mathbb{P})$. If $B_1 \supseteq B_2 \supseteq \ldots$, i.e., B_i is a decreasing sequence of sets, then show that

$$\lim_{j \to \infty} P(B_j) = P(\cap_{i=1}^{\infty} B_i).$$

Question 2 (From Bruce Hajek's book):

1. Suppose an event E is independent of itself. What is $P(E)$?
2. Suppose events A and B are such that $P(A) = 0.3$ and $P(B) = 0.4$, what is $P(A \cup B)$ if A and B are independent?
3. Suppose events A and B are such that $P(A) = 0.6$ and $P(B) = 0.5$, are A and B independent? Are A and B mutually exclusive?

Question 3 (From Bruce Hajek's book): At the end of each day Professor Plum puts her glasses in her drawer with probability .90, leaves them on the table with probability .06, leaves them in her briefcase with probability 0.03, and she actually leaves them at the office with probability 0.01. The next morning she has no recollection of where she left the glasses. She looks for them, but each time she looks in a place the glasses are actually located, she misses finding them with probability 0.1, whether or not she already looked in the same place. (After all, she doesn't have her glasses on and she is in a hurry.)

1. Given that Professor Plum didn't find the glasses in her drawer after looking one time, what is the conditional probability the glasses are on the table?
2. Given that she didn't find the glasses after looking for them in the drawer and on the table once each, what is the conditional probability they are in the briefcase?
3. Given that she failed to find the glasses after looking in the drawer twice, on the table twice, and in the briefcase once, what is the conditional probability she left the glasses at the office?