REVIEW PROBLEMS No. 2

Textbook Problems: 3.5, 3.6, 3.9, 3.10, 3.18

Problem S2.1 (pair-wise independence): Consider a set of 3 distinct events A, B, and C, such that

- A tells us nothing about C;
- B tells us nothing about C;
- Together, A and B tell us everything about C.

Provide a simple example of 3 events that exhibit this property [Hint: see if you can use two coin tosses?]

Problem S2.2 (conditional independence): Assume that two events, A and B, are independent. However, A and B are not independent anymore once we condition on a third event C. Produce an example of 3 events that satisfy this condition [Hint: Think again about two coin tosses]

Problem S2.3: Consider a computer system whose hard-drive and processor can fail independently, where each day the probability that the hard-drive fails is p_1 and the probability that the processor fails is p_2, *i.e.,* both probability of failures follow a geometric distribution with parameters p_1 and p_2, respectively. Provide an expression, function of p_1 and p_2 for the probability that the processor fails before the hard-drive.
Hint: Condition on the smaller of the two failure times (in number of days).