AI1110
Assignment-8

R Bhargava Ram
CS21BTECH11052

May 20, 2022

Outline

Abstract

- This document contains the solution to a Question
- In Papoulis Probability Textbook
- In Chapter 2 Problems

Question

Problem 2-14:

The events A and B are mutually exclusive. Can they be independent?

Theory

Mutually Exclusive Events

Two events A and B are said to be mutually exclusive if they cannot occur at the same time or simultaneously. Mutually exclusive events are also called Disjoint events. So,

$$\Pr(AB) = 0 \tag{1}$$

Independent Events

Two events A and B are said to be independent events if the probability of occurrence of one of them is not affected by occurrence of the other.

$$\Pr(AB) = \Pr(A) \times \Pr(B) \tag{2}$$

Solution

Given,
Events A and B are mutually exclusive.
According to question,
If events A and B are also independent then from definitions we get

$$\therefore \Pr(A) \times \Pr(B) = 0 \tag{3}$$

So, $\Pr(A) = 0$ or $\Pr(B) = 0$
Hence, Events A and B are mutually exclusive and independent if and only if the probability of atleast one of them is 0.