

AI1110 Assignment-8

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Abstract—This document contains the solution of Papoulis Probability Chapter 2 Problems 2-14.

PROBLEMS 2-14 : The events A and B are mutually exclusive. Can they be independent?

Solution:

Given,

Events A and B are mutually exclusive.

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,

$$\Pr(AB) = 0 \quad (1)$$

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.

$$\Pr(AB) = \Pr(A) \times \Pr(B) \quad (2)$$

If events A and B are also independent then from definitions we get

$$\therefore \Pr(A) \times \Pr(B) = 0 \quad (3)$$

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.