AI1110 Assignment 5

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Outline

Abstract

- This document contains the solution to Question of Chapter 12 (Probability) in the NCERT Class 12 Textbook.

Question

Probability ex 13.1 q11.

A fair die is rolled. Consider events E = {1,3,5}, F = {2,3} and G = {2,3,4,5} .
Find

1. $\Pr(E|F)$ and $\Pr(F|E)$
2. $\Pr(E|G)$ and $\Pr(G|E)$
3. $\Pr((E \cup F)|G)$ and $\Pr((E \cap F)|G)$

Theory

Let X=0 be a random variable representing event E.
Let Y=0 be a random variable representing event Y.
Let Z=0 be a random variable representing event Z.

Solution

1.

$$\Pr(E|F) = \frac{\Pr(EF)}{\Pr(F)} \tag{1}$$

$$= \frac{\Pr(X=0, Y=0)}{\Pr(Y=0)} \tag{2}$$

$$= \frac{\frac{1}{6}}{\frac{2}{6}} \tag{3}$$

$$= \frac{1}{2} \tag{4}$$

1.

$$\Pr(F|E) = \frac{\Pr(EF)}{\Pr(E)} \tag{5}$$

$$= \frac{\Pr(Y=0, X=0)}{\Pr(X=0)} \tag{6}$$

$$= \frac{\frac{1}{6}}{\frac{3}{6}} \tag{7}$$

$$= \frac{1}{3} \tag{8}$$

1

$$\Pr(E|G) = \frac{\Pr(EG)}{\Pr(G)} \tag{9}$$

$$= \frac{\Pr(X=0, Z=0)}{\Pr(Z=0)} \tag{10}$$

$$= \frac{\frac{2}{6}}{\frac{4}{6}} \tag{11}$$

$$= \frac{1}{2} \tag{12}$$

1.

$$\Pr(G|E) = \frac{\Pr(EG)}{\Pr(E)} \tag{13}$$

$$= \frac{\Pr(Z=0, X=0)}{\Pr(X=0)} \tag{14}$$

$$= \frac{\frac{2}{6}}{\frac{3}{6}} \tag{15}$$

$$= \frac{2}{3} \tag{16}$$

1.

$$\Pr\left(E+F|G\right)=\frac{\Pr\left((E+F)G\right)}{\Pr\left(G\right)} \tag{17}$$

$$=\frac{\Pr\left(X=1,Y=0\right)+\Pr\left(X=0,Y=1\right)-\Pr\left(X=0,Y=0\right),Z=0}{\Pr\left(Z=0\right)} \tag{18}$$

$$=\frac{3}{4} \tag{19}$$

1.

$$\Pr\left((EF)|G\right) = \frac{\Pr\left((EF)G\right)}{\Pr\left(G\right)} \tag{20}$$

$$= \frac{\Pr\left((X=0, Y=0), Z=0\right)}{\Pr\left(Z=0\right)} \tag{21}$$

$$= \frac{\frac{1}{6}}{\frac{4}{6}} \tag{22}$$

$$= \frac{1}{4} \tag{23}$$