AI-1110 Assignment-1

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12.13.1.11 Question: 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) $\Pr((E+F)|G)$ and $\Pr((EF)|G)$

Solution: Sample space when a die is rolled = {1,2,3,4,5,6}.

E = {1,3,5}	$\Pr(E) = 1/2$
F = {2,3}	$\Pr(F) = 1/3$
G = {2,3,4,5}	$\Pr(G) = 2/3$
EF = {3}	$\Pr(EF) = 1/6$
EG = {3,5}	$\Pr(EG) = 1/3$
(E+F)G = {2,3,5}	$\Pr((E+F)G) = 1/2$
(EF)G = {3}	$\Pr((EF)G) = 1/6$

TABLE 3: From given data

1)

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

$$From \quad table \quad 3, \tag{2}$$

$$\Pr(E|F) = 1/2 \tag{3}$$

2)

$$\Pr(F|E) = \frac{\Pr(EF)}{\Pr(E)} \tag{4}$$

$$From \quad table \quad 3, \tag{5}$$

$$\Pr(F|E) = 1/3 \tag{6}$$

3)

$$\Pr(E|G) = \frac{\Pr(EG)}{\Pr(G)} \tag{7}$$

$$From \quad table \quad 3, \tag{8}$$

$$\Pr(E|G) = 1/2 \tag{9}$$

4)

$$\Pr(G|E) = \frac{\Pr(EG)}{\Pr(E)} \tag{10}$$

$$From \quad table \quad 3, \tag{11}$$

$$\Pr(G|E) = 2/3 \tag{12}$$

5)

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

$$From \quad table \quad 3, \tag{14}$$

$$\Pr((E+F)G) = 3/4 \tag{15}$$

6)

$$\Pr((EF)|G) = \frac{\Pr((EF)G)}{\Pr(G)} \tag{16}$$

$$From \quad table \quad 3, \tag{17}$$

$$\Pr((EF)|G = 1/4 \tag{18}$$

Answer:

$$\Pr(E|F) = 1/2, \tag{19}$$

$$\Pr(F|E) = 1/3, \tag{20}$$

$$\Pr(E|G) = 1/2, \tag{21}$$

$$\Pr(G|E) = 2/3, \tag{22}$$

$$\Pr((E+F)|G) = 3/4, \tag{23}$$

$$\Pr((EF)|G) = 1/4 \tag{24}$$