Assignment1

DAMARAGIDDA BHARADWAJA RAO
CS20BTECH11012

March 2021

Q 1.17 Determine P(E/F), if two coins are tossed once, where
(i) E : tail appears on one coin, F : one coin shows head
(ii) E : no tail appears, F : no head appears

solution

X	0	1	2
P(X)	$\binom{2}{0}(0.5)^2 = \frac{1}{4}$	$\binom{2}{1}(0.5)^2 = \frac{1}{2}$	$\binom{2}{2}(0.5)^2 = \frac{1}{4}$

Table 1: Probability of number of heads shown on the coins

(i) Let X denotes the number of heads shown up during the simultaneous toss of two coins,so where $i = 1, j = 2$ n : number of coins $= 2$ and p: the probability of getting a head is $\frac{1}{2}$ By binomial distribution

$$\begin{aligned}
P(F) &= P(X \geq 1) \\
&= P(X = i) + P(X = j) \\
P(X = i) &= \binom{n}{i} p^2 \\
P(X = j) &= \binom{n}{j} p^2 \\
\text{hence} P(F) &= \binom{n}{i} p^2 + \binom{n}{j} p^2 \\
P(F) &= \frac{1}{2} + \frac{1}{4} = \frac{3}{4} \\
P(EF) &= P(X = i) = \binom{n}{i} p^2 \\
P(EF) &= \frac{1}{2} \\
P(E/F) &= \frac{2}{3}
\end{aligned}$$

(ii)
$$\begin{aligned}
P(F) &= P(X = k) \\
&= \binom{n}{k} p^2, k = 2 \\
&= \frac{1}{4} \\
P(EF) &= 0 \\
P(E/F) &= 0
\end{aligned}$$