

# Assignment 1

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## 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** Let  $X$  denote the number of heads shown on the coins, where  $n = 2$  and  $P = 0.5$

$$p(x) = \Pr(X = x) = \binom{n}{x} \times P^x$$

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 I: Probability of number of heads shown on the coins

i

$$\Pr(F) = \Pr(X \geq 1) \quad (1)$$

$$\Pr(F) = \Pr(X = 1) + \Pr(X = 2) \quad (2)$$

$$= \frac{1}{2} + \frac{1}{4} = \frac{3}{4}$$

$$\Pr(EF) = \Pr(X = 1) = \frac{1}{2} \quad (3)$$

$$\Pr(E/F) = \frac{\Pr(EF)}{\Pr(F)} = \frac{2}{3} \quad (4)$$

ii

$$\Pr(F) = \Pr(X = 0) = \frac{1}{4} \quad (5)$$

$$\Pr(EF) = 0 \quad (6)$$

$$\Pr(E/F) = \frac{\Pr(EF)}{\Pr(F)} = 0 \quad (7)$$