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, q = 1-p

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

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

$$\Pr(F) = \Pr(X \geq 1) \tag{1}$$
$$\Pr(F) = \Pr(X = 1) + \Pr(X = 2) \tag{2}$$
$$= \frac{1}{2} + \frac{1}{4} = \frac{3}{4}$$
$$\Pr(EF) = \Pr(X = 1) = \frac{1}{2} \tag{3}$$
$$\Pr(E/F) = \frac{\Pr(EF)}{\Pr(F)} = \frac{2}{3} \tag{4}$$

ii

$$\Pr(F) = \Pr(X = 0) = \frac{1}{4} \tag{5}$$
$$\Pr(EF) = 0 \tag{6}$$
$$\Pr(E/F) = \frac{\Pr(EF)}{\Pr(F)} = 0 \tag{7}$$