Probability Assignment

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Question: Find $P(E|F)$ for
(i)E: tail appears on one coin.
F: head appears on one coin.
(ii)E: no tail appears.
F: no head appears.
Solution: Sample space of the experiment may be described as

$$S = (HH, HT, TH, TT) \tag{1}$$

(i) E: tail appears on one coin.

$$E = (HT, TH) \tag{2}$$
$$P(E) = \frac{2}{4} \tag{3}$$
$$= \frac{1}{2} \tag{4}$$

F: head appears on one coin.

$$F = (HT, TH) \tag{5}$$
$$P(F) = \frac{2}{4} \tag{6}$$
$$= \frac{1}{2} \tag{7}$$

From (2) and (5) we have

$$EF = (HT, TH) \tag{8}$$
$$P(EF) = \frac{2}{4} \tag{9}$$
$$= \frac{1}{2} \tag{10}$$
$$P(E|F) = \frac{P(EF)}{P(F)} \tag{11}$$
$$= \frac{\frac{1}{2}}{\frac{1}{2}} \tag{12}$$
$$= 1 \tag{13}$$

(ii) E: no tail appears.

$$E = (HH) \tag{14}$$
$$P(E) = \frac{1}{4} \tag{15}$$

F: no head appears.

$$F = (TT) \tag{16}$$
$$P(F) = \frac{1}{4} \tag{17}$$

From (14) and (16) we have

$$EF = () \tag{18}$$
$$P(EF) = \frac{0}{4} \tag{19}$$
$$= 0 \tag{20}$$
$$P(E|F) = \frac{P(EF)}{P(F)} \tag{21}$$
$$= \frac{0}{\frac{1}{4}} \tag{22}$$
$$= 0 \tag{23}$$