Assignment

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Question 1.15 Consider the experiment of throwing a die, if a multiple of 3 comes up, throw the die again and if any other number comes,toss a coin. Find the conditional probability of the event ”the coin shows a tail”, given that ” at least one die shows a 3”.

Solution: Let,the event
outcome of die as A, and outcome of Coin toss as B (0 for heads and 1 for tails)

$$P_r(A = k) = \frac{1}{6} \qquad 1 \le k \le 6 \tag{1}$$

$$P_r(B = k) = \frac{1}{2} \qquad 0 \le k \le 1 \tag{2}$$

Since the die roll and and coin toss are independent events,

$$P_r(A = k, B = 1) = P_r(A = k) \times P_r(B = 1) \tag{3}$$

$$= \begin{cases} \frac{1}{12} & k \in \{1, 2, 4, 5\} \\ 0 & \text{otherwise} \end{cases} \tag{4}$$

So, from the definition of conditional probability,

$$P_r(B = 1|A = 3) = \frac{P_r(B = 1, A = 3)}{P_r(A = 3)} \tag{5}$$

$$= \frac{0}{P_r(A = 3)} \tag{6}$$

$$= 0 \tag{7}$$