

Assignment 3

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Question: 15) Consider the experiment of throwing a die. If a multiple of 3 comes up, throw the die again. If any other number comes up, 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: The experiment: A die is thrown:

- 1) A multiple of 3 (i.e 3 or 6) out of 6 outcomes(1, 2, 3, 4, 5, 6)
- 2) Any other number (i.e 1, 2, 4, 5) then a coin is tossed (H, T)

The sample space of the experiment is given by:

$$S = \{(3, 1), (3, 2), (3, 3), (3, 4), (3, 5), (3, 6), \\ (6, 1), (6, 2), (6, 3), (6, 4), (6, 5), (6, 6), \\ 1H, 2H, 4H, 5H, 1T, 2T, 4T, 5T\}$$

Let E be the event that the coin shows a tail and
Let F be the event that at least one die shows a 3.

$$\text{Then, } E = \{1T, 2T, 4T, 5T\}$$

$$F = \{(3,1), (3,2), (3,3), (3,4), (3,5), (3,6), (6,3)\}.$$

$$\implies EF = \emptyset, \quad (1)$$

$$\implies \Pr(EF) = 0. \quad (2)$$

Therefore, the conditional probability of the event the coin shows a tail given that at least one die shows a 3 is:

$$\Pr(E|F) = \frac{\Pr(EF)}{\Pr(F)} \quad (3)$$

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

$$= 0 \quad (5)$$

Hence, the conditional probability is 0.