ASSIGNMENT-12

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Download all python codes from

https://github.com/Gayathri1729/SRFP/tree/main/Assignment12

and latex-tikz codes from

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1 PROBABILITY 2.18

A man is known to speak truth 3 out of 4 times. He throws a die and reports that it is a six. Find the probability that it is actually a six.

2 SOLUTION

Let $X \in \{0,1\}$ and $Y \in \{0,1\}$ where, From the

X	0	Man says truth
	1	Man lie
Y	0	Die shows six
	1	Die shows number other than 6

given information we have,

$$Pr(X=0) = \frac{3}{4} \tag{2.0.1}$$

$$Pr(X=1) = \frac{1}{4} \tag{2.0.2}$$

$$Pr(Y=0|X=0) = \frac{1}{6} \tag{2.0.3}$$

$$Pr(Y=0|X=1) = \frac{5}{6} \tag{2.0.4}$$

The probability that the die shows 6 given the man reports it is six,

$$Pr(X=0|Y=0) = \frac{Pr(Y=0|X=0)Pr(X=0)}{\sum_{i=0}^{1} Pr(Y=0|X=i)Pr(X=i)} \tag{2.0.5}$$

Substituting the given values in (2.0.5),

$$Pr(X=0|Y=0) = \frac{\frac{1}{6}\frac{3}{4}}{\frac{1}{6}\frac{3}{4} + \frac{5}{6}\frac{1}{4}} = \frac{3}{8} \tag{2.0.6}$$

Thus, the probability that the die shows 6 given the man reports it is six is 0.375 .

i.e., $Pr(X=0|Y=0) = \frac{3}{8}$.