

Assignment4

CS20Btech11035 -NYALAPOGULA MANASWINI

Download python code from

<https://github.com/N-Manaswini23/assignment4/tree/main/python%20codes>

Download latex code from

<https://github.com/N-Manaswini23/assignment4/blob/main/assignment4.tex>

GATE 2021 XE-A QUESTION 7(PG:9)

A person who speaks truth 3 out of 4 times, throws a fair dice with six faces and informs the outcome is 5. The probability that the outcome is really 5 is

SOLUTION

Event	definition
A	Event of person speaking truth
B	Event of person speaking false
C	Event that person informs outcome of dice is 5
$\Pr(C A)$	Probability of person informing outcome is 5 if person speaks truth
$\Pr(C B)$	Probability of person informing outcome is 5 if person speaks false
$\Pr(A C)$	Probability of person speaking truth(outcome is 5) if person informs outcome is 5

TABLE 0: Table 1

Probability	$\Pr(A)$	$\Pr(B)$	$\Pr(C A)$	$\Pr(C B)$
value	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{1}{6}$	$\frac{5}{6}$

TABLE 0: Table 2

From Baye's theorem

$$\Pr(C) = \Pr(C|A) \times \Pr(A) + \Pr(C|B) \times \Pr(B) \quad (0.0.1)$$

Substituting values from table (0) in (0.0.1)

$$\Pr(C) = \frac{1}{6} \times \frac{3}{4} + \frac{5}{6} \times \frac{1}{4} \quad (0.0.2)$$

$$= \frac{8}{24} \quad (0.0.3)$$

We need to find $\Pr(A|C)$

$$\Pr(A|C) = \frac{\Pr(AC)}{\Pr(C)} \quad (0.0.4)$$

$$= \frac{\Pr(C|A) \times \Pr(A)}{\Pr(C)} \quad (0.0.5)$$

$$= \frac{\frac{1}{6} \times \frac{3}{4}}{\frac{8}{24}} \quad (0.0.6)$$

$$= \frac{3}{8} \quad (0.0.7)$$

\therefore The desired probability that outcome is really 5 $= \frac{3}{8} = 0.375$



