ASSIGNMENT 7

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Download all python codes from

https://github.com/manik2255/AI1103−PROBABILITY−AND−RANDOM−VARIABLES/blob/main/ASSIGNMENT_7/assign_7.py

and latex-tikz codes from

https://github.com/manik2255/AI1103−PROBABILITY−AND−RANDOM−VARIABLES/blob/main/ASSIGNMENT_7/ASSIGNMENT_7.tex

1 GATE 2021 ST PROBLEM.14

Let A and b be two events such that $\Pr(B) = \frac{3}{4}$ and $\Pr(A \cup B^c) = \frac{1}{2}$.If A and B are independent, then $\Pr(A)$ equals

2 SOLUTION

Given,

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

$$\Pr(A \cup B^c) = \frac{1}{2} \tag{2.0.2}$$

we know that,

$$\Pr(B^c) = 1 - \Pr(B) \tag{2.0.3}$$

using (2.0.1) in (2.0.3),

$$\Pr(B^c) = \frac{1}{4} \tag{2.0.4}$$

we know that,

$$\Pr(A \cup B^c) = \Pr(A) + \Pr(B^c) - \Pr(A \cap B^c) \tag{2.0.5}$$

A and B are independent $\iff$ A and B^c are independent

$$\Pr(A \cup B^c) = \Pr(A) + \Pr(B^c) - \Pr(A)\Pr(B^c) \tag{2.0.6}$$

using (2.0.2) and (2.0.4) in (2.0.6)

$$\frac{1}{2} = \Pr(A) + \frac{1}{4} - \frac{\Pr(A)}{4} \tag{2.0.7}$$

$$\frac{1}{4} = \frac{3\Pr(A)}{4} \tag{2.0.8}$$

$$\therefore \Pr(A) = \frac{1}{3} \tag{2.0.9}$$