

AI1103-Assignment 2

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Download latex-tikz codes from

<https://github.com/asishcs2011010/demo/blob/main/assignment-2/assignment-2.tex>

QUESTION NO

Gate-EC Q-38

QUESTION

Let $X \in \{0, 1\}$ and $Y \in \{0, 1\}$ be two independent binary random variables. if $P(X = 0) = p$ and $P(Y = 0) = q$, then $P(X + Y \geq 1)$ is equal to

- (A) $pq + (1 - p)(1 - q)$ (C) $p(1 - q)$
 (B) pq (D) $1 - pq$

SOLUTION

Given $\Pr(X=0) = p$, $\Pr(Y=0) = q$ and X and Y are independent binary random variables.

X	$X = 0$	$X = 1$
Pr	p	$1 - p$

Y	$Y = 0$	$Y = 1$
Pr	q	$1 - q$

$P(X + Y \geq 1) = 1 - P(X + Y < 1)$

$(X + Y < 1, \text{ implies } X=0, Y=0; \text{ as } X \in \{0, 1\} \text{ and } Y \in \{0, 1\})$

$P(X + Y \geq 1) = 1 - (P(X = 0)(Y = 0))$ (as they are independent events)

$P(X + Y \geq 1) = 1 - pq$