AI1103 Assignment 3

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Download all python codes from

https://github.com/MShah134/AI1103/blob/main/Assignment−3/Python%20codes

And latex-tikz codes from

https://github.com/MShah134/AI1103/blob/main/Assignment−3/Latex%20codes

Question

Two dice are thrown simultaneously. The probability that the product of the numbers appearing on the top faces of the dice is a perfect square is
(a) 1/9
(b) 2/9
(c) 1/3
(d) 4/9

Solution

1) Let $\Pr(X = i)$ be the probability i is obtained on dice 1
2) Let $\Pr(Y = i)$ be the probability i is obtained on dice 2

Consider table 2:

Case(s)	Notes	Probability
$\Pr(X = i)$	i=1,2,...6	1/6
$\Pr(Y = i)$	i=1,2,...6	1/6

TABLE 2: Probabilities of random variables

The favourable cases for $\{X, Y\}$ are:
$\{1,1\}$, $\{2,2\}$, $\{3,3\}$, $\{4,4\}$, $\{5,5\}$, $\{6,6\}$, $\{1,4\}$, $\{4,1\}$
(Since the numbers are ≤ 6, they are either the same or both are perfect squares)
Now, for the probability p:

$$\begin{aligned}\Pr(p) = &\sum_{i=1}^{6} \Pr(X = i)\Pr(Y = i) \\ &+ \Pr(X = 1)\Pr(Y = 4) \\ &+ \Pr(X = 4)\Pr(Y = 1) \qquad (0.0.1)\\ \Pr(p) = &\ 6(1/6)(1/6) + 2(1/6)(1/6) \qquad (0.0.2)\\ \Pr(p) = &\ 2/9 \qquad (0.0.3)\end{aligned}$$

Hence option (b) 2/9 is correct