Assignment 3

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1 PROBLEM [GATE(2015)MA-11]

In an experiment, a fair die is rolled until two sixes are obtained in succession. The probability that the experiment will end in the fifth trial is equal to
(A) $\frac{125}{6^5}$ (B) $\frac{150}{6^5}$ (C) $\frac{175}{6^5}$ (D) $\frac{200}{6^5}$

2 SOLUTION

	Probability of	Result
$Pr(X_1 = 1)$	first two rolls must not be both 6	$1 - \left(\frac{1}{6} \times \frac{1}{6}\right) = \frac{35}{6^2}$
$Pr(X_2 = 1)$	third roll must not be 6	$1 - \frac{1}{6} = \frac{5}{6}$
$Pr(X_3 = 1)$	last two rolls must be 6	$\frac{1}{6} \times \frac{1}{6} = \frac{1}{6^2}$

TABLE 0: Probability of random variables.

Required probability is

$$Pr(X_1 = 1, X_2 = 1, X_3 = 1) = \frac{35}{6^2} \times \frac{5}{6} \times \frac{1}{6^2} = \frac{175}{6^5}$$

$$(2.0.1)$$

Hence (C) is correct option.