NCERT 11.16.3.3

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Question:11.16.3.3
Suppose an integer from 1 through 1000 is chosen at random, find the probability that the integer is a multiple of 2 or a multiple of 9.

Solution:
Declare a random variable X.
$p_X(k)$ = Probability that the chosen number is a multiple of k.

Parameter	Value	Description
X=2	$P_X(2) = \frac{500}{1000}$	n mod 2 = 0, n is divisible by 2
X=9	$P_X(9) = \frac{111}{1000}$	n mod 9 = 0, n is divisible by 9
X=18	$P_X(18) = \frac{55}{1000}$	n mod 18 = 0, n is divisible by 2 & 9

TABLE 0: Random Variables

$$p_X(k) = \begin{cases} \frac{500}{1000} & k = 2 \\ \frac{111}{1000} & k = 9 \\ \frac{55}{1000} & k = 18 \end{cases} \tag{1}$$

$$\Pr\left((X = 2) + (X = 9)\right) = p_X(2) + p_X(9) - p_X(18) \tag{2}$$

$$= \frac{500}{1000} + \frac{111}{1000} - \frac{55}{1000} \tag{3}$$

$$= \frac{556}{1000} \tag{4}$$

$$= 0.556 \tag{5}$$

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