Question 10.13.3.34

There are 1000 sealed envelopes in a box, 10 of them contain a cash prize of Rs 100 each, 100 of them contain a cash prize of Rs 50 each and 200 of them contain a cash prize of Rs 10 each and rest do not contain any cash prize. If they are well shuffled and an envelope is picked up out, what is the probability that it contains no cash prize?.

Solution: Let

$$X = \begin{cases} 1, & \text{if cash prize} \\ 0, & \text{if no cash prize} \end{cases} \tag{1}$$

Let X_1 represent the random variable for selecting an envelope with a cash prize of Rs 100.
Let X_2 represent the random variable for selecting an envelope with a cash prize of Rs 50.
Let X_3 represent the random variable for selecting an envelope with a cash prize of Rs 10.
Then

$$P_{X1}(1) = \frac{10}{1000} \tag{2}$$
$$= \frac{1}{100} \tag{3}$$
$$= 0.01 \tag{4}$$
$$P_{X2}(1) = \frac{100}{1000} \tag{5}$$
$$= \frac{1}{10} \tag{6}$$
$$= 0.1 \tag{7}$$
$$P_{X3}(1) = \frac{200}{1000} \tag{8}$$
$$= \frac{2}{10} \tag{9}$$
$$= 0.2 \tag{10}$$

Probablity of no cash prize

$$P_X(0) = 1 - (P_{X1}(1) + P_{X2}(1) + P_{X3}(1)) \tag{11}$$
$$= 1 - \frac{31}{100} \tag{12}$$
$$= 0.69 \tag{13}$$