Assignment 6

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Download all python codes from

https://github.com/adhvik24/AI1103-PROBABILITY-AND-RANDOM-VARIABLES/tree/main/ASSIGNMENT_6/codes

and latex-tikz codes from

https://github.com/adhvik24/AI1103-PROBABILITY-AND-RANDOM-VARIABLES/blob/main/ASSIGNMENT_6/AI1103_Assignment6.tex

1 CSIR UGC NET EXAM (Dec 2015), Q.3

The probability that a ticketless traveler is caught during a trip is 0.1. If the traveler makes 4 trips , the probability that he/she will be caught during at least one of the trips is:

(A) $1-(0.9)^4$ (B) $(1-0.9)^4$
(C) $1-(1-0.9)^4$ (D) $(0.9)^4$

2 Solution

Let $X \in \{0,1\}$ be a random variable denoting the ticketless traveller is caught or not.(1 if caught and 0 if he is safe).
Given,

$$\Pr(X=1) = 0.1 \tag{2.0.1}$$
$$\Pr(X=0) = 1-\Pr(X=1) = 0.9 \tag{2.0.2}$$

Then probability of being caught in atleast one trip is(Let this event be 'E'),

$$\Pr(E) = 1-\Pr(\textit{being safe in all trips}) \tag{2.0.3}$$

As each trip is independent of other and he/she makes 4 trips in total,

$$\Pr(\textit{being safe in all trips}) = (\Pr(X=0))^4 \tag{2.0.4}$$

Using (2.0.2) and (2.0.4) in (2.0.3),

$$\Pr(E) = 1-\Pr(\textit{being safe in all trips}) \tag{2.0.5}$$
$$= 1-(\Pr(X=0))^4 \tag{2.0.6}$$
$$= 1-(0.9)^4 \tag{2.0.7}$$

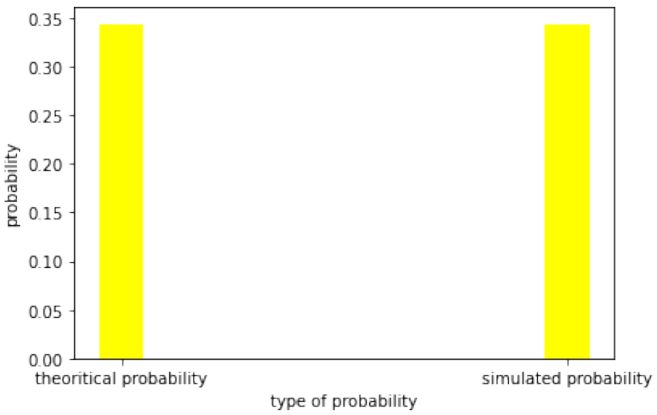

Fig. 1: probability that he/she will be caught during at least one of the trips

Therefore the probability that he/she will be caught during at least one of the trips is $1-(0.9)^4$.
ANSWER : (A)