Assignment1

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1 11.16.4.6 QUESTION

Q: Three letters are dictated to three persons and an envelope is addressed to each of them, the letters are inserted into the envelopes at random so that each envelope contains exactly one letter. Find the probability that at least one letter is in its proper envelope.

solution:

Consider, $L = \{0, 1, 2\}$, $E = \{0, 1, 2\}$, $p =$ probability that no envelope contains the same letter.

Table of assigning different letters to different envelopes :

Letter	Envelope 1	Envelope 2
0	1	2
1	2	0
2	0	1

There are 2 possible different assignments of letters to envelopes.

The total number of possible assignments is 3! = 6.

$$\therefore \; p = \frac{\text{number of different assignments}}{\text{total number of assignments}}$$
$$= \frac{2}{6}$$
$$= \frac{1}{3}.$$

The required probability that at least one letter is in its proper envelope is $1 - p$,

$$1 - p = 1 - \frac{1}{3}$$
$$= \frac{2}{3}.$$