Assignment 3

AI1110: Probability and Random Variables

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Question

Question 8

A die is thrown three times,

E : 4 appears on the third toss,

F : 6 and 5 appears respectively on first two tosses.

Determine $P(\frac{E}{F})$

Formula

Relevant formula

Probability of A occurring IF B occurs, $P(A|B)$ is given as:

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

Solution

Probability of 4 appearing on the third toss,
P(E): $\frac{1}{6}$
Probability of 6 appearing on the first toss,
P1: $\frac{1}{6}$
Probability of 5 appearing on the second toss,
P2: $\frac{1}{6}$

Solution(contd.)

Probability of 5 appearing on the second toss AND 6 appearing on the first toss, P(F) is given as:

$$P(F) = P1 \times P2 \tag{1}$$

$$= \frac{1}{6} \times \frac{1}{6} = \frac{1}{36} \tag{2}$$

Probability of E AND F, $P(E \cap F)$ is given as:

$$P(E \cap F) = P(E) \times P(F) \tag{3}$$

$$= \frac{1}{6} \times \frac{1}{36} = \frac{1}{256} \tag{4}$$

Solution(contd.)

We know that,
Probability of A occurring IF B occurs, $P(A|B)$ is given as:

$$\mathrm{P(A \mid B)} = \frac{P(A \cap B)}{P(B)} \tag{5}$$

$\therefore$ The probabilty of the problem being solved, P(Solved) will be given by

$$\mathrm{P(E \mid F)} = \frac{P(E \cap F)}{P(F)} \tag{6}$$

$$\mathrm{P(E \mid F)} = \frac{(\frac{1}{256})}{(\frac{1}{36})} \tag{7}$$

$$\mathrm{P(E \mid F)} = \frac{1}{6} \tag{8}$$

$\therefore$ The probabilty $\mathrm{P}(\frac{E}{F})$ will be 1/6.

Python Code

```
p1=1/6          #Probability of 4 appearing on the third toss,
p2=1/6          #Probability of 6 appearing on the first toss,
p3=1/6          #Probability of 5 appearing on the second toss
Pe=p1           # E is the event that 4 appears on the third toss
Pf=p2*p3        # F is the event that 6 and 5 appears respectively on
first two tosses
PEnF=Pe*Pf
Pelf=PEnF/Pf    # By formula
print(" The probabilty P(E/F) will be ",Pelf)
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