Assignment-1

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Download all python codes from

https://github.com/AdilSalfi/AI1103/tree/main/Assignment-1

and latex-tikz codes from

https://github.com/AdilSalfi/AI1103/tree/main/Assignment-1/Codes

Problem

Question 2.17: Three cards are drawn successively, without replacement from a pack of 52 well shuffled cards. What is the probability that first two cards are kings and the third card drawn is an ace?

Solution

Let X_i where $i \in \{1, 2, 3\}$ be random variables which represent the outcome of the card drawn on the *ith* turn such that the random varaibles X_i take values $\{0, 1, 2\}$

1) $X_i = 0$ represents King card is drawn
2) $X_i = 1$ represents Ace card is drawn
3) $X_i = 2$ represents neither King nor Ace cards are drawn

We need to find $\Pr(X_1 = 0, X_2 = 0, X_3 = 1)$. Using Conditional Probability and the fact that the Random Variables are independent of each other we can write

$$\begin{aligned}\Pr(X_1 = 0, X_2 = 0, X_3 = 1) = \Pr(X_1 = 0) \times \\ \Pr(X_2 = 0 | X_1 = 0) \times \\ \Pr(X_3 = 1 | X_1 = 0, X_2 = 0)\end{aligned} \quad (0.0.1)$$

$$\begin{aligned}\Pr(X_1 = 0, X_2 = 0, X_3 = 1) &= \frac{4}{52} \times \frac{3}{51} \times \frac{4}{50} \\ &= 0.000362\end{aligned} \quad (0.0.2)$$

Therefore, the required Probability is 0.000362