

1. Two cards are drawn (without replacement) from a usual deck of 52 cards. Let

$$A = \{\text{The first card drawn is an ace.}\} \quad B = \{\text{The second card drawn is an ace.}\}$$

Compute (i) $\mathbb{P}(A)=$

(ii) $\mathbb{P}(B|A)=$

(iii) $\mathbb{P}(B \cap A)=$

(iv) Are A and B independent?

2. Consider a biased coin that turns up Head with probability p , and turns up Tail with probability $q = 1 - p$. We keep flipping this coin until it turns up Head for the first time. Let X denote the number of flips. Express, in terms of q , the probability $\mathbb{P}(X \text{ takes an even value}) =$

Bonus Consider the previous problem and assume this time $\mathbb{P}(X \text{ takes an even value}) = \frac{1}{4}$. Determine $\mathbb{E}X$.