Two cards are drawn successively without replacement from a shuffled deck of cards. Make a probability distribution table where random variable x represents the number of heart.

Solution

There are 13 hearts ♥ in a full deck of 52 cards.

Random variable x represents the number of heart.

WITHOUT REPLACEMENT: If you draw two cards from the deck without replacement, what is the probability that there will be no hearts?

$$P(X = 0) = P(no\ heart\ and\ no\ heart) = \left(\frac{39}{52}\right)\left(\frac{38}{51}\right) = \frac{19}{34}$$

WITHOUT REPLACEMENT: If you draw two cards from the deck without replacement, what is the probability that there will be the only heart?

$$P(X = 1) = P(\ heart\ and\ no\ heart) + P(\ no\ heart\ and\ heart) =$$

$$= \left(\frac{39}{52}\right)\left(\frac{13}{51}\right) + \left(\frac{13}{52}\right)\left(\frac{39}{51}\right) = \frac{13}{34}$$

WITHOUT REPLACEMENT: If you draw two cards from the deck without replacement, what is the probability that they will both be hearts?

$$P(X = 2) = P(\ heart\ and\ heart) = \left(\frac{13}{52}\right)\left(\frac{12}{51}\right) = \frac{1}{17}$$

Check

$$P(X = 0) + P(X = 1) + P(X = 2) = \frac{19}{34} + \frac{13}{34} + \frac{1}{17} = 1$$

X takes value	Probability
0	$\frac{19}{34}$
1	$\frac{13}{34}$
2	$\frac{1}{17}$
Total	1