AI1110
Assignment 7

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Outline

Exercise 13.2.3

A box of oranges is inspected by examining three randomly selected oranges drawn without replacement. If all the three oranges are good, the box is approved for sale, otherwise, it is rejected. Find the probability that a box will be saled , which containing 15 oranges out of which 12 are good and 3 are bad ones will be approved for sale.

Solution

Let random variable $X_1, X_2, X_3 \in \{1, 2\}$ denote the following events in Table (**??**)

Event	Description
$X_1 = 1$	good orange obtained
$X_2 = 1$	second good orange being good
$X_3 = 2$	two oranges drawn being good

Table 1: Description of events

Theory Related to this Question

Picking the objects with replacement and without replacement:

Input probabilities

Probability	Value
$\Pr(X_1 = 1)$	$\frac{12}{15} = \frac{4}{5}$
$\Pr(X_1 = 0)$	$\frac{1}{5}$
$\Pr(X_2 = 1 \mid X_1 = 1)$	$\frac{11}{14}$
$\Pr(X_2 = 1 \mid X_1 = 0)$	$\frac{12}{14} = \frac{6}{7}$
$\Pr(X_3 = 1 \mid X_1 = 1, X_2 = 1)$	$\frac{10}{13}$
$\Pr(X_3 = 1 \mid X_1 = 0, X_2 = 1)$	$\frac{11}{13}$

Table 2: Input probabilities

Answer

probability for getting all good oranges is :

$$\Pr(X_1 = 1) \times \Pr(X_2 = 1|X_1 = 1) \times \Pr(X_3 = 1|X_1 = 1, X_2 = 1) \quad (1)$$

$$= \frac{4}{5} \times \frac{11}{14} \times \frac{10}{13} \quad (2)$$

$$= 0.483 \quad (3)$$