

P2:

Four bad apples are mixed accidentally with 20 good apples. Obtain the probability distribution of the number of bad apples in a draw of 2 apples at random.

Solution:

Let X denote the number of bad apples drawn. Then X is a random variable which can take the values 0, 1 or 2. There are $4 + 20 = 24$ apples, in all and the exhaustive number of cases of drawing 2 apples is ${}^{24}C_2$.

$$\therefore P(X = 0) = \frac{{}^{20}C_2}{{}^{24}C_2} = \frac{20 \times 19}{24 \times 23} = \frac{95}{138}$$

$$P(X = 1) = \frac{{}^4C_1 \times {}^{20}C_1}{{}^{24}C_2} = \frac{2 \times 4 \times 20}{24 \times 23} = \frac{40}{138}$$

$$P(X = 2) = \frac{{}^4C_2}{{}^{24}C_2} = \frac{4 \times 3}{24 \times 23} = \frac{3}{138}.$$

Hence, the probability distribution of X is given by :

$x :$	0	1	2
$p(x) :$	$\frac{95}{138}$	$\frac{40}{138}$	$\frac{3}{138}$