An overseas shipment of 5 foreign automobiles contains 2 that have slight paint blemishes. If an agency receives 3 of these automobiles at random, find the probability distribution of the random variable X representing the number of automobiles with paint blemishes purchased by the agency. Find the mean number of automobiles with paint blemishes. Also, calculate the variation.

Answer

Let letter B represent blemished automobiles and U represent the non-blemished ones. Since 3 automobiles are picked at random, here is the sample space:

Sample Space	Random variable x
UUU	0
UUB	1
UBU	1
BUU	1
BBU	2
BUB	2
UBB	2

Therefore, the probability distribution will be as follows:

$f(0)=\frac{\binom{3}{3}\binom{2}{0}}{\binom{5}{3}}=\frac{1}{10}$

$f(1)=\frac{\binom{3}{2}\binom{2}{1}}{\binom{5}{3}}=\frac{6}{10}$

$f(2)=\frac{\binom{3}{1}\binom{2}{2}}{\binom{5}{3}}=\frac{3}{10}$

x	0	1	2
f(x)	$\frac{1}{10}$	$\frac{6}{10}$	$\frac{3}{10}$

Mean number of automobiles with paint blemishes=$5*\frac{3}{10}=1.5\equiv 1$ automobile

The variation=$5*\frac{3}{10}*(1-\frac{3}{10})=1.05\equiv 1$ automobile