

Answer on Question #58839 – Math – Statistics and Probability

Question

4 oranges are mixed accidentally with 16 good oranges. Find the probability distribution of the number of bad oranges in a draw of two oranges.

Solution

$$P(X = 0) = \frac{\binom{16}{2}}{\binom{20}{2}} = \frac{\frac{16!}{2!14!}}{\frac{20!}{2!18!}} = \frac{16 \cdot 15 \cdot 2}{2 \cdot 20 \cdot 19} = \frac{12}{19} = \frac{60}{95}$$

$$P(X = 1) = \frac{\binom{4}{1} \binom{16}{1}}{\binom{20}{2}} = \frac{\frac{4!}{1!3!} \cdot \frac{16!}{1!15!}}{\frac{20!}{2!18!}} = \frac{4 \cdot 16 \cdot 2}{20 \cdot 19} = \frac{32}{95}$$

$$P(X = 2) = \frac{\binom{4}{2}}{\binom{20}{2}} = \frac{\frac{4!}{2!2!}}{\frac{20!}{2!18!}} = \frac{4 \cdot 3 \cdot 2}{2 \cdot 20 \cdot 19} = \frac{3}{95}$$

Probability distribution

X=x	0	1	2
P(X=x)	$\frac{60}{95}$	$\frac{32}{95}$	$\frac{3}{95}$