Answer on Question #58640 – Math – Statistics and Probability

Question

• solve the question by (i) factorial method, (ii) using venn diagram:

Q. Four items are taken at random from a box of 12 items and inspected. The box is rejected if more than 1 item is found to be faulty. If there are three items are faulty in the box, find the probability that the box is accepted.

Solution

Factorial Method

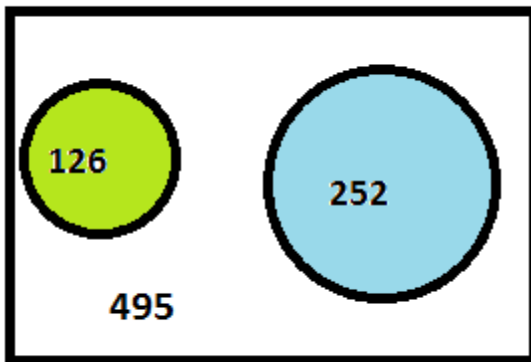We can choose 4 items from 12 in $C_{12}^4 = \frac{12!}{4!8!} = 495$ ways.

We can choose 0 faulty items in $C_9^4 C_3^0 = \frac{9!}{4!5!} = 126$ ways.

We can choose 1 faulty item in $C_9^3 C_3^1 = \frac{9!}{3!5!} \frac{3!}{1!2!} = 252$ ways.

Thus, the probability that the box is accepted will be

$$P = \frac{C_9^4 C_3^0 + C_9^3 C_3^1}{C_{12}^4} = \frac{126+252}{495} = \frac{378}{495} = \frac{42}{55} \approx 0.7636.$$

Venn diagram

Answer: $\frac{42}{55} \approx 0.7636.$