

Conditions

Assume I have box of 200 matching black socks but 10 of those socks have a hole.
If I randomly select 3 socks from the box what are the odds that all 3 socks will have a hole.

Solution

The classic probability definition claims that the probability of some event is the rate of all favorable outcomes for this event to all possible outcomes. So, we must divide the amount of all possible ways to take 3 socks with a hole from a set of 200 socks on the amount of taking 3 random socks. The probability is:

$$P = \frac{C_{10}^3}{C_{200}^3} = \frac{\frac{10!}{3!7!}}{\frac{200!}{3!197!}} = \frac{8 \cdot 9 \cdot 10}{198 \cdot 199 \cdot 200} = 0.0000931$$