

that occurs

def: Sampling without replacement $\equiv$ outcome x is removed from sample space (set of possible outcomes) after each trial.

ex: 3 scope probes out of 20 are bad

1st student takes a probe (chosen at random) to bench

leaving 19 probes

2nd " " " " " " " " " "

leaving 18 probes

3rd " " " " " " " " " "

leaving 17 probes

Find $P\{2 \text{ out of } 3 \text{ probes taken by students are bad}\}$

soln: 1st trial $P\{\text{choosing any particular probe}\} = \frac{1}{20}$
 2nd trial " " " " " " " " " "
 3rd trial " " " " " " " " " "

Consider possible scenarios for 2 out of 3 bad.
 (good, bad, bad) (bad, good, bad) (bad, bad, good)

Each trial is independent of previous trial (but has a different sample space (set of poss outcomes).

• Probabilities multiply

$$P\{\text{good, bad, bad}\} = \frac{17}{20} \cdot \frac{3}{19} \cdot \frac{2}{18} = \frac{102}{20 \cdot 19 \cdot 18}$$

$$P\{\text{bad, good, bad}\} = \frac{3}{20} \cdot \frac{17}{19} \cdot \frac{2}{18} = \frac{102}{20 \cdot 19 \cdot 18}$$

$$P\{\text{bad, bad, good}\} = \frac{3}{20} \cdot \frac{2}{19} \cdot \frac{17}{18} = \frac{102}{20 \cdot 19 \cdot 18}$$

$$P\{2 \text{ out of } 3 \text{ bad}\} = 3 \cdot \frac{102}{20 \cdot 19 \cdot 18} = \frac{306}{20 \cdot 19 \cdot 18}$$