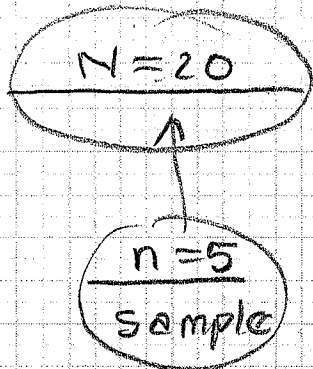


## THE HYPERGEOMETRIC DISTRIBUTION

Example: Suppose a container has 20 engines, 3 of which are defective. If we draw 5 engines from the container, without replacement, what is the probability of getting 2 defective?



success = getting a defective engine

First draw  $p = \frac{3}{20}$

2nd draw  $p = \frac{2}{19}$  or  $\frac{3}{19}$

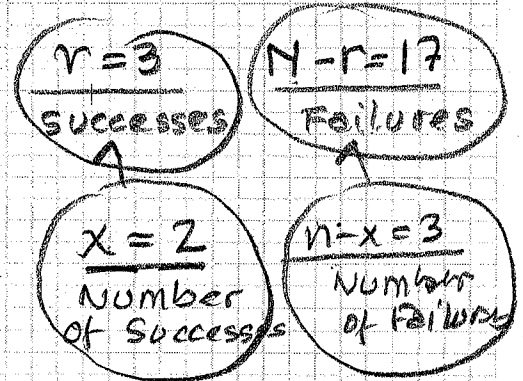
$N$  = total number of elements = 20

$n$  = number of elements drawn = 5

$r$  = number of successes in  $N = 3$

$x$  = number of successes in  $n$

$X$  is the Hypergeometric Random Variable



$$P(x) = \frac{\binom{r}{x} \binom{N-r}{n-x}}{\binom{N}{n}}$$

$$P(2) = \frac{\binom{3}{2} \binom{17}{3}}{\binom{20}{5}} = \frac{5}{38} \approx .13$$

$$\mu = \frac{nr}{N}$$

$$\sigma^2 = \frac{r(N-r)n(N-n)}{N^2(N-1)}$$