17 de Octubre de 2016.

- Variable aleatoria Hipergeométrica
  (Experimentos sin reemplazo)

- Variable aleatoria Binomial
  (Experimentos con reemplazo)

En una caja 20 C.D. hay 3 defectuosos
"N" "m"

Experimento sacando 4 de ellos (sin reempl.)
"n"
ver cuándo salga el primer defectuoso

$N = 20$ $m = 3$ $n = 4$

$$P(X=k) = \frac{C_k^m \cdot C_{n-k}^{N-m}}{C_n^N}$$

rango $\max(n+m-N, \emptyset) \leq k \leq \min(n, m)$

$$\max(4+3-20, 0) \leq k \leq \min(4, 3)$$

$$0 \leq k \leq 3$$

$N_1 = 20 \qquad m = 3 \qquad n = 4$

$0 \leq k \leq 3$

$$P(X=0) = \frac{C_0^3 \cdot C_{4-0}^{20-3}}{C_4^{20}}$$

$$\boxed{C_b^a = \frac{a!}{b!(a-b)!}}$$

$$C_0^3 = \frac{3!}{0!(3!)} = 1$$

$$C_4^{17} = \frac{17!}{4!(13!)} = \frac{17 \times 16 \times 15 \times 14 \times \cancel{13!}}{4 \times 3 \times 2 \times 1 \times \cancel{13!}} = 2{,}380$$

$$C_4^{20} = \frac{20!}{4!(16!)} = \frac{20 \times 19 \times 18 \times 17 \times \cancel{16!}}{24 \times \cancel{16!}} = 4{,}845$$

$$P(X=0) = 0{,}49122$$

$$\boxed{P(X=k)=\frac{C_k^m\, C_{n-k}^{N-m}}{C_n^N} \qquad \begin{aligned} N&=20\\ m&=3\\ n&=4\end{aligned}}$$ fórmula

$$P(X=1)=\frac{C_1^3\cdot C_3^{17}}{C_4^{20}}$$

$$\boxed{P(X=1)=0.4210}$$

$$C_1^3=\frac{3!}{1!\,2!}=3$$

$$\rightarrow C_3^{17}=\frac{17!}{3!\,14!}=\frac{17\times16\times15\times\cancel{14!}}{(3\times2\times1)\times\cancel{14!}}=680$$

$$C_4^{20}=\frac{20!}{4!\,16!}=\frac{20\times19\times18\times17}{24}=4845$$

$$P(X=2) = \frac{C_2^3 \times C_2^{17}}{C_4^{20}} =$$

$$C_2^3 = \frac{3!}{2!\,1!} = \frac{3 \times \cancel{2!}}{\cancel{2!} \times 1} = 3$$

$$C_2^{17} = \frac{17!}{2!\,15!} = \frac{17 \times 16 \times 15!}{2 \times 1 \times 15!} = \frac{17 \times 16}{2} = 136$$

$$C_4^{20} = 4845$$

$$P(x=2) = \frac{3 \times 136}{4845}$$

$$P(x=2) = 0.0842$$

$$P(X=3) = \frac{C^{3}_{3} \cdot C^{17}_{1}}{C^{20}_{4}}$$

$$C^{3}_{3} = \frac{3!}{3!\,0!} = 1$$

$$C^{17}_{1} = \frac{17!}{1!\,16!} = \frac{17}{1} = 17$$

$$C^{20}_{4} = 4845$$

$$P(X=3) = \frac{1 \times 17}{4845}$$

$$\boxed{P(X=3) = 0{,}0035}$$

$$\sum_{k=0}^{3} P(X=k) = 1$$

$P(X=0) = 0{,}4912$

$P(X=1) = 0{,}4211$

$P(X=2) = 0.0842$

$P(X=3) = 0{,}0035$

1.0000

VARIABLE ALEATORIA HIPERGEOMÉTRICA.

X	0	1	2	3
$P(X=k)$	0,4912	0,4211	0,0842	0.0035

$$E(X) = n\left(\frac{m}{N}\right) = 4\left(\frac{3}{20}\right) = 0.6$$

$$V(X) = n\left(\frac{m}{N}\right)\left(1-\frac{m}{N}\right)\left(\frac{N-n}{N-1}\right) = 4\left(\frac{3}{20}\right)\left(\frac{17}{20}\right)\left(\frac{16}{19}\right) = 0,4295$$

$$\sigma = 0.6553$$

Distribución de Probabilidad

de. "Poisson".

próxima clase