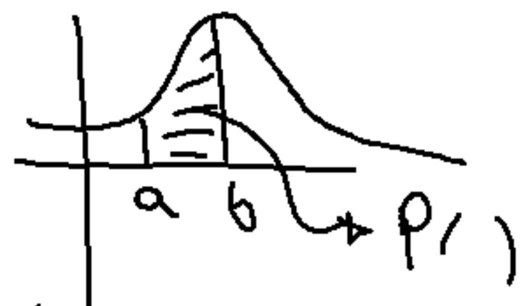
7 de Noviembre de 2016.

- Aproximación de la Distribución Binomial (VAD) a la Distribución Normal (VAC).

NORMAL (VAC)

$$f(X=k)=\frac{1}{\sigma\sqrt{2\pi}}e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$



función de densidad

$$P(a\leq x\leq b)=\int_a^b f(x)\,dx \Rightarrow P(-\infty\leq x\leq \infty)=1$$

Binomial (VAD).

$$P(X=k)=C_k^n\, p^k q^{n-k}$$

$p \Rightarrow$ VERDADERO

$q=(1-p)$ FALSO

Binomial.

$\mu = E(x) = n \cdot p$

$V(x) = n \cdot p \cdot q$.

$\sigma = \sqrt{V(x)} = \sqrt{n \cdot p \cdot q}$.

$p \Rightarrow$

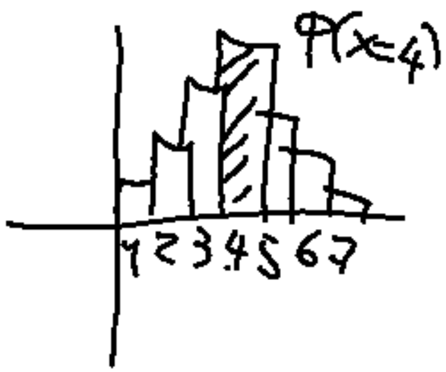
$q \Rightarrow$

$\mu_{normal} \equiv E(x)_{Binomial}$.

$P(X=k) = C_k^n p^k q^{n-k}$

$P(a \le x \le b) = \int_a^b \frac{e^{\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}}{\sigma\sqrt{2\pi}}$

Binomial.



Condiciones de aproximación

$n \cdot p \geq 5$ $\quad n \cdot (1-p) \geq 5$ $\quad$ Discreto

para aplicar la D. Normal

$\mu = n \cdot p$

$\sigma = \sqrt{n \cdot p \cdot q}$ $\quad P(x \geq a)$

$\leq$ $>$	$+0.5$
$\geq$ $<$	-0.5

$$\left.\begin{array}{l} P(x \geq 5) \\ \mu = 7 \\ \sigma \end{array}\right\} Z = \frac{\overset{x}{5} - \overset{\mu}{7} + 0.5}{\sigma} = \frac{-1.5}{\sigma}$$

$P(x>5) = P(x=6) + P(x=7) + P(x=8) + P(x=9)$

$P(x<5)$

Binomial $\quad n \cdot p = 7$

$\left.\begin{matrix} np \geq 5 \\ nq \geq 5 \end{matrix}\right\}$

σ

$x \quad \mu$

$$Z = \frac{5 - 7 + 0.5}{\sigma}$$

$P(x>5)$

$$Z = \frac{5 - 7 - 0.5}{\sigma}$$

$P(x<5)$

Fábrica de alfiles 2.5% defectuosos

muestra de 200

$P(x \geq 3)$

(12.92%)

$P(0)+P(1)+P(2)$	$P(3)+P(4)+P(5)+ \dots +P(200)$
$P(x \geq 3) = 1 - P(x<3)$	(87.08%)

$n = 200 \quad p = 0{,}025 \quad q = 0{,}975$

$np \geq 5 \quad \mu = (200)(0.025) = 5$ ✓

$n \cdot (1-p) \geq 5 \quad (200)(0.975) = 195$ ✓

$\mu = n \cdot p = 5$

$\sigma = \sqrt{npq} = \sqrt{200 \cdot (0.025) \cdot (0.975)}$

$\sigma = 2.2079$

cómo sabemos cuál es el ajuste

$+0.5 \quad -0.5$

$P(X \geq 3) = P(x > 2)$

$$Z = \frac{2 - 5 + 0.5}{2.2079} = \frac{-2.5}{2.2079}$$

$$Z = \frac{3 - 5 - 0.5}{2.2079} = \frac{-2.5}{2.2079}$$

$Z = -1.1322$

$P(-\infty \leq x \leq -1.1322) = 0.1292$

$P(-1.1322 \leq x \leq \infty) = 0.8708$

87.08%

n=	200
p=	0.025
q=	0.975
mu=	5
desv=	2.20794022

k			
0	0.006323		
1	0.03242564		
2	0.08272695	0.12147559	0.87852441
3	0.13999945		
4	0.17679418		
5	0.17770081		
6	0.14808401		
7	0.10523186		
8	0.06509535		
9	0.03560771		
10	0.01743865		
11	0.00772341		
12	0.00311907		
13	0.00115658		
14	0.00039612		
15	0.00012595		
16	3.7339E-05		
17	1.0363E-05		
18	2.7014E-06		
19	6.635E-07		
20	1.5397E-07		
21	3.3839E-08		
22	7.0596E-09		
23	1.4009E-09		
24	2.6491E-10		
25	4.782E-11		
26	8.253E-12		
27	1.3637E-12		
28	2.1605E-13		
29	3.2856E-14		
30	4.8021E-15		
31	6.7523E-16		
32	9.1438E-17		
33	1.1936E-17		
34	1.5032E-18		
35	1.8281E-19		
36	2.1484E-20		
37	2.4417E-21		
38	2.6856E-22		
39	2.8604E-23		
40	2.9521E-24