

5 de Octubre de 2016

- Distribución de Probabilidades Binomial

$p \Rightarrow$  probabilidad de éxito (Verdadera)  
 $(1-p) = q \Rightarrow$  " " fracaso (falsa).

media  $E(x) = \sum_{i=0}^n (x_i) p(x_i) = n \cdot p$

Varianza  $V(x) = \sum_{i=0}^n (x_i - E(x))^2 p(x_i) = n p q$

desviación estandar  $= \sqrt{n p q}$

Urna 3 rojas  $n=10$   $\phi(x_i) = \frac{1}{10}$   
7 azules

bola azul.  
 $\phi = 0.7$  (70%)  $q = 1 - 0.7 \Rightarrow 0.3$  (30%)

$P_x(0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10)$

valor medio  
esperado  $E(X) = (10)(0.7) = 7$

$$V(X) = (10)(0.7)(0.3) = 2.1$$

$$\sigma = \sqrt{2.1} = 1.449$$

Extraer 4 bolas  $\rightarrow$  Prob de que 2 sean azules  
con reposado

$$P(X \geq 2) = P(X=2) + P(X=3) + P(X=4)$$

$$P(X=2) = C_2^4 p^2 q^2 = \frac{4!}{2!2!} (0,7)^2 (0,3)^2 = \frac{4 \times 3 \times \cancel{2!}}{2! \cancel{2!}} (0,49)(0,09)$$

$$= 0,2646$$

$$P(X=3) = C_3^4 p^3 q^1 = \frac{4!}{3!1!} (0,7)^3 (0,3) = (1,2)(0,343)$$

$$= 0,4116$$

$$P(X=4) = C_4^4 p^4 q^0 = (1)(0,7)^4 (1) = 0,2401$$

$$P(X \geq 2) = 0,2646 + 0,4116 + 0,2401 = 0,9163$$

$$P(X \geq 2) = 1 - P(X=0) - P(X=1)$$

$$P(X=0) = \binom{4}{0} p^0 q^4 = \frac{4!}{0!(4!)} (1)(0.3)^4 = 0.0081$$

$$P(X=1) = \binom{4}{1} p^1 q^3 = \frac{4!}{1!(3!)} (0.7)(0.3)^3 =$$

$$= 4(0.7)(0.027) = 0.0756$$

$$P(X \geq 2) = 1 - 0.0081 - 0.0756 = 0.9163$$

$$C_k^n = \frac{n!}{k!(n-k)!}$$

$n! = n \times (n-1)!$
$1! = 1$
$0! = 1$

$$C_2^4 = \frac{4!}{2!(2!)} = \frac{4 \times 3 \times \cancel{2!}}{(\cancel{2!})(\cancel{2!})} = \frac{4 \times 3}{2 \times 1} = 6$$

$$C_3^4 = \frac{4!}{3!(1!)} = \frac{4 \times \cancel{3!}}{\cancel{3!}} = 4$$

$$C_4^4 = \frac{4!}{4!(0!)} = 1$$

10 bolos 3 verdes 7 azules

$$n=25 \quad P(x \geq 16) \quad p(0.7) \quad q(0.3)$$

$$P(x \geq 16) = P(x=16) + P(x=17) + \dots + P(x=25)$$

$$P(x=16) = \binom{25}{16} p^{16} q^9$$

$$P(x \geq 16) = 1 - P(x=15)$$

$$= 1 - 0.1894 \Rightarrow 0.8106$$

81%

$$\left\{ \begin{array}{l} p=0.99 \quad q=0.01 \end{array} \right.$$

$$\mathcal{R}(0, 1, 2, 3)$$

$$E(X) = (3)(0.99) = 2.97$$

$$V(X) = (3)(0.99)(0.01) = 0.0297$$

$$\sigma = \sqrt{0.0297} = 0.1723$$

$$P(X=0) = \binom{3}{0} p^0 q^3 \Rightarrow \frac{3!}{0!(3!)} (0.99)^0 (0.01)^3 = 0.000001$$

$$P(X=1) = \binom{3}{1} p^1 q^2 \Rightarrow \frac{3!}{1!(2!)} (0.99)^1 (0.01)^2 = 0.000297$$

$$P(X=2) = \binom{3}{2} p^2 q^1 \Rightarrow \frac{3!}{2!(1!)} (0.99)^2 (0.01) = 0.00297$$

$$P(X=3) = 0.97$$