

# Estimación

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Ejercicios.

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Halla el estimador máximo verosímil del parámetro  $p$  de la distribución Bernoulli.

$$X \sim \text{Bernoulli}(p)$$

Valor  
función de  
probabilidad

$$X \rightarrow \begin{cases} 1 & p \\ 0 & 1-p \end{cases}$$

$$p(x) = P(X=x) = p^x \cdot (1-p)^{1-x}$$

Función de Verosimilitud.

$$L(p) = \prod_{i=1}^n p(x_i) = \prod_{i=1}^n p^{x_i} \cdot (1-p)^{1-x_i}$$

$$= p^{\sum_{i=1}^n x_i} \cdot (1-p)^{\sum_{i=1}^n (1-x_i)}$$

$$= p^{\sum x_i} \cdot (1-p)^{n - \sum x_i}$$

logaritmo de l.

$$l = \ln L = \ln p^{\sum x_i} + \ln (1-p)^{n-\sum x_i}$$

$$= \sum x_i \cdot \ln(p) + (n - \sum x_i) \cdot \ln(1-p).$$

Derivar con respecto a p. Igualar a cero:

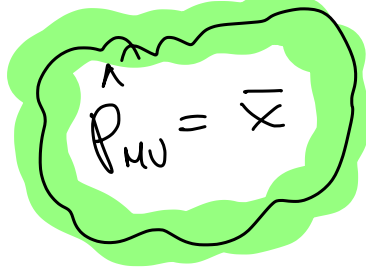
$$0 = \frac{\partial l}{\partial p} = \frac{\sum x_i}{p} + \frac{(n - \sum x_i) \cdot (-1)}{1-p}$$

$$0 = \frac{\sum x_i}{p} - \frac{n - \sum x_i}{1-p} \rightarrow \frac{n - \sum x_i}{1-p} = \frac{\sum x_i}{p}$$

$$p(n - \sum x_i) = (1-p) \sum x_i \rightarrow p \cdot n - \cancel{p \sum x_i} = \sum x_i - \cancel{p \sum x_i}$$

$$p \cdot n = \sum x_i$$

$$p = \frac{\sum x_i}{n}$$



$$p_{\mu} = \bar{x}$$