

Estadística y análisis de datos

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La mayor parte de lo que aparece a continuación fue extraído de la primer referencia que aparece a continuación.

- Probability and statistics in particle physics. A. Frodesen.
- Statistical methods in experimental physics. F. James.
- Data reduction and error analysis for the physical sciences. P. Bevington, K. Robinson.

- Variables.
- Media, mediana, valor medio.
- Varianza y parametros de forma de orden superior.

- Variable y dato.
- Espacio muestral y muestra.
- Variable discreta o continua.
- Variable aleatoria.

Media, Mediana, Valor medio

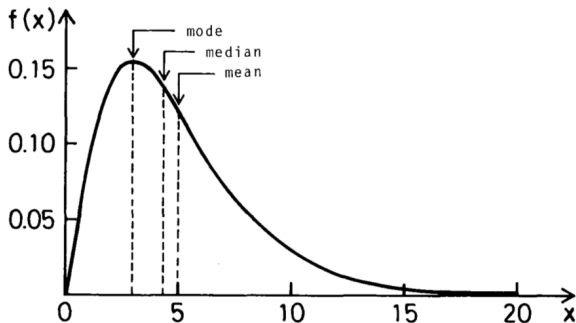


Fig. 3.1. Location parameters for a unimodal probability density function. (The curve corresponds to a chi-square p.d.f. for 5 degrees of freedom.)

Valor de espectación : $E(x) = \int xf(x) dx = \langle x \rangle$

$$\text{Valor medio: } E(x) = \int xf(x) dx = \mu$$

$$\text{Varianza: } E(x - \mu)^2 = \int (x - \mu)^2 f(x) dx = \sigma^2$$

$$\text{Skewness: } \gamma_1 = \frac{E(x-\mu)^3}{\sigma^3} = \frac{\mu_3}{\mu_2^{3/2}}$$

$$\text{Kurtosis: } \gamma_2 = \frac{E(x-\mu)^4}{\sigma^4} - 3 = \frac{\mu_4}{\mu_2^2} - 3$$

- Distribución gaussiana.
- Distribución binomial.
- Distribución de poisson.
- Distribución Bose-Einstein.

Distribución gaussiana o normal

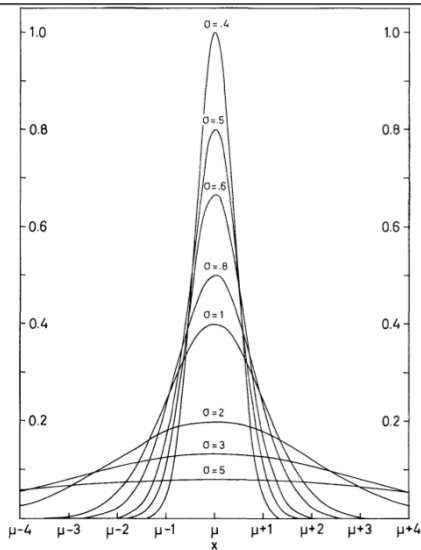


Fig. 4.6. The normal p.d.f. $N(\mu, \sigma^2)$ for different values of the standard deviation σ .

Distribución binomial

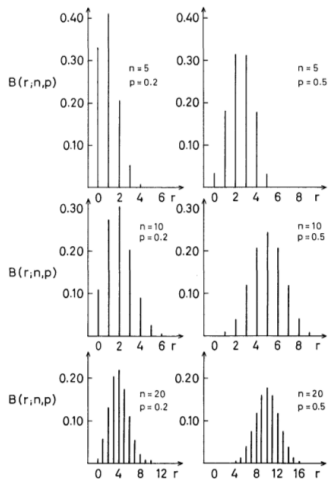
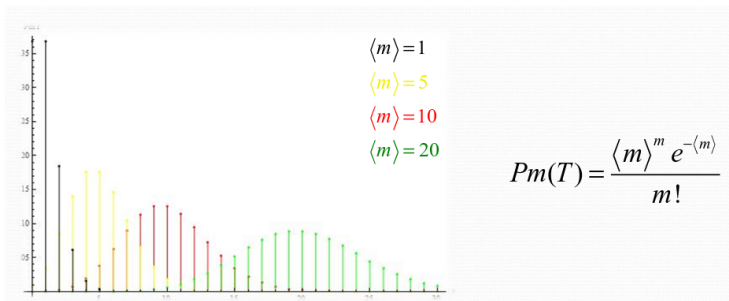


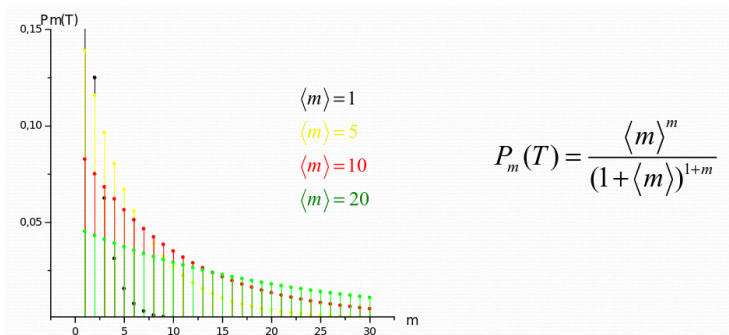
Fig. 4.1. The binomial distribution for indicated values of the parameters n, p .

$$B(r; n, p) = \binom{n}{r} p^r (1-p)^{n-r}, \quad r = 0, 1, 2, \dots, n.$$

Distribución binomial



Distribución binomial



Relación entre distribuciones

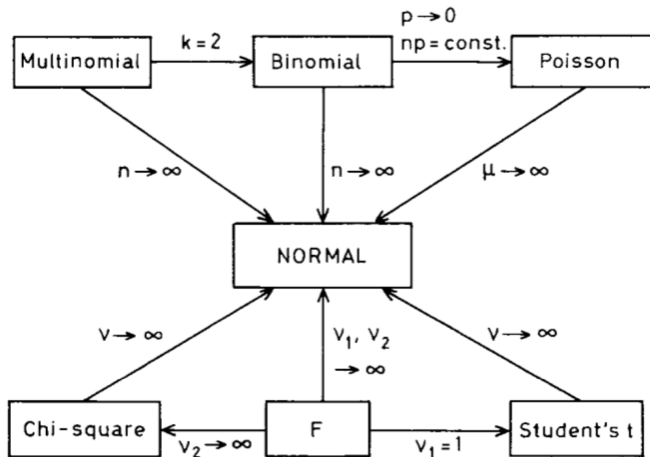


Fig. 5.5. Relations between probability distributions.

- Intervalos de confianza.
- Tests y parametros para estudiar la correlación entre variables.
- Ejemplos de papers.

Intervalos de confianza

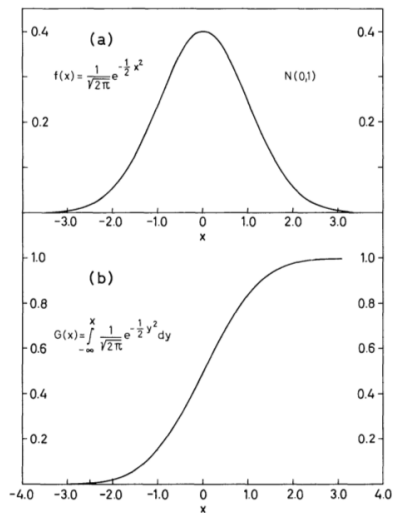
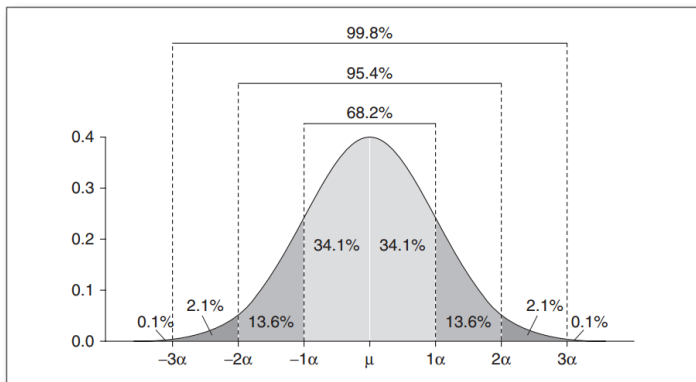


Fig. 4.7. (a) The standard normal p.d.f. $N(0,1)$.
(b) The cumulative standard normal distribution.

Intervalos de confianza



Source: Image courtesy of Wikipedia.

¿Que es un test de hipotesis?

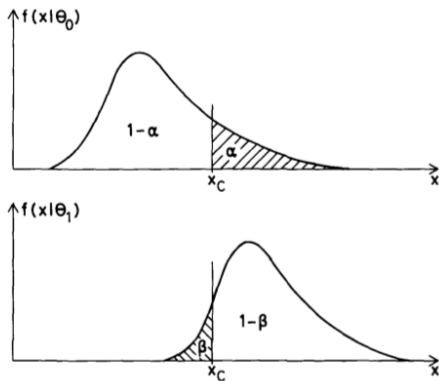


Fig. 14.2. Illustration of Type I error α and Type II error β .

The power of a test is defined as the probability of rejecting a hypothesis when it is false. We have for the power of the test of the null hypothesis H_0 against the alternative H_1 :

$$\text{Power} = 1 - \beta = \int_R f(x|\theta_1) dx = \int_{x_C}^{\infty} f(x|\theta_1) dx. \quad (14.3)$$