Formulario [1]

- **Valor medio** e **incertidumbre total**

$$\bar{X} = \frac{1}{n}\sum_{i=1}^{n} X_i \qquad\qquad \Delta X = \sqrt{E_s^2 + E_a^2}$$

Siendo E_s incertidumbre de precisión, E_a incertidumbre aleatoria, ΔX incertidumbre total:

- **Incertidumbre aleatoria** de la media:

$$E_a = t_{n-1}\frac{\sigma_{n-1}}{\sqrt{n}} \qquad\qquad \sigma_{n-1} = \sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(X_i - \bar{X})^2}$$

- **Factores t_ν para un nivel de confianza del 95 %** :

ν	2	3	4	5	6	7	8	9	10	20	muchos
t_ν	4,30	3,18	2,78	2,57	2,45	2,36	2,30	2,26	2,22	2,09	1,96

- **Medidas indirectas**

$$Y = f(x_1, x_2, x_3, \cdots)$$

$$(\Delta Y)^2 = \left(\frac{\partial f}{\partial x_1}\Delta x_1\right)^2 + \left(\frac{\partial f}{\partial x_2}\Delta x_2\right)^2 + \left(\frac{\partial f}{\partial x_3}\Delta x_3\right)^2 + \cdots$$

- **Casos simples**

$$y = x_1 + x_2 \qquad\qquad \Delta y = \sqrt{(\Delta x_1)^2 + (\Delta x_2)^2}$$

$$y = x_1 \times x_2 \qquad\qquad \Delta y = y\sqrt{\left(\frac{\Delta x_1}{x_1}\right)^2 + \left(\frac{\Delta x_2}{x_2}\right)^2}$$

$$y = \frac{x_1}{x_2} \qquad\qquad \Delta y = y\sqrt{\left(\frac{\Delta x_1}{x_1}\right)^2 + \left(\frac{\Delta x_2}{x_2}\right)^2}$$

- **Media ponderada**

$$\bar{Y} = \frac{\displaystyle\sum_{i=1}^{n}\frac{Y_i}{(\Delta Y_i)^2}}{\displaystyle\sum_{i=1}^{n}\frac{1}{(\Delta Y_i)^2}} \pm \frac{1}{\sqrt{\displaystyle\sum_{i=1}^{n}\frac{1}{(\Delta Y_i)^2}}}$$

- **Regresión lineal**

$$E = \left(\sum_{i=1}^{n} x_i y_i\right) - n\bar{x}\bar{y} \qquad\qquad D = \left(\sum_{i=1}^{n} x_i^2\right) - n\bar{x}^2$$

$$m = \frac{E}{D} \qquad\qquad c = \bar{y} - m\bar{x}$$

$$\sigma_{res}^2 = \frac{1}{n-2}\sum_{i=1}^{n}(y_i - mx_i - c)^2$$

$$\sigma_m^2 = \frac{\sigma_{res}^2}{D} \qquad\qquad \sigma_c^2 = \sigma_{res}^2\left(\frac{1}{n} + \frac{\bar{x}^2}{D}\right)$$

$$\Delta m = t_{n-2}\cdot\sigma_m \qquad\qquad \Delta c = t_{n-2}\cdot\sigma_c$$

$$r = \frac{n\sum_{i=1}^{n} x_i y_i - \left(\sum_{i=1}^{n} x_i\right)\left(\sum_{i=1}^{n} y_i\right)}{\sqrt{n\sum_{i=1}^{n} x_i^2 - \left(\sum_{i=1}^{n} x_i\right)^2}\sqrt{n\sum_{i=1}^{n} y_i^2 - \left(\sum_{i=1}^{n} y_i\right)^2}}$$

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[1] Versión del 03/06/2009