# REGRESIONES LINEALES Y NO LINEALES

**1. REGRESION LINEAL** $y = bx + a$

$$y = bx + a$$

$$a = \frac{\sum x^2 \sum y - \sum x \sum xy}{n\sum x^2 - (\sum x)^2}$$

$$b = \frac{n\sum xy - \sum x \sum y}{n\sum x^2 - (\sum x)^2}$$

**2. REGRESION CUADRATICA** $y = a + bx + cx^2$

$$y = a + bx + cx^2$$

$$an + b\sum x + c\sum x^2 = \sum y$$

$$a\sum x + b\sum x^2 + c\sum x^3 = \sum xy$$

$$a\sum x^2 + b\sum x^3 + c\sum x^4 = \sum x^2 y$$

**3. REGRESION CUBICA** $y = a + bx + cx^2 + dx^3$

$$y = a + bx + cx^2 + dx^3$$

$$an + b\sum x + c\sum x^2 + d\sum x^3 = \sum y$$

$$a\sum x + b\sum x^2 + c\sum x^3 + d\sum x^4 = \sum xy$$

$$a\sum x^2 + b\sum x^3 + c\sum x^4 + d\sum x^5 = \sum x^2 y$$

$$a\sum x^3 + b\sum x^4 + c\sum x^5 + d\sum x^6 = \sum x^3 y$$

**4. REGRESION LOGARITMICA** $y = a + b\,lnX$

$$y = a + b\,lnX$$

$$b = \frac{n\sum x'y - \sum x' \sum y}{n\sum x'^2 - (\sum x')^2}$$

$$\boldsymbol{a = \bar{y} - b\,\bar{x}'}$$

**Donde:**
**X'=ln x**

**5. REGRESION POTENCIA** $y = ax^b$

$$y = ax^b$$

$$b = \frac{n\sum x'y' - \sum x' \sum y'}{n\sum x'^2 - (\sum x')^2}$$

$$\boldsymbol{a = \bar{y}' - b\,\bar{x}'}$$

Sabemos que a' = log a

Despejamos $a = 10^{-a'}$

**Donde:**
**x'=log (X)**
**y'=log(Y)**

**6.REGRESION EXPONENCIAL** $y = ae^{bx}$

$$y = ae^{bx}$$

$$b = \frac{n\sum xy' - \sum x \sum y'}{n\sum x^2 - (\sum x)^2}$$

$$\boldsymbol{a = \bar{y}' - b\,\bar{x}}$$

Sabemos que a' = ln a

Despejamos $a = e^{a'}$

**Donde:**
**Y'=ln Y**

**7.REGRESION INVERSA** $y = a + \frac{b}{x}$

$$b = \frac{n\sum x'y - \sum x' \sum y}{n\sum x'^2 - (\sum x')^2}$$

$$\boldsymbol{a = \bar{y} - b\,\bar{x}'}$$

**Donde: X'=1/X**

# REGRESION MULTIPLE

$$\begin{bmatrix} n & \sum x1 & \sum x2.... & \sum xn \\ \sum x1 & \sum x1^2 & \sum x1x2 & \sum x1xn \\ \sum x2 & \sum x2x1 & \sum x2^2 & \sum x2xn \\ \sum xn & \sum xnx1 & \sum xnx2 & \sum xn^2 \end{bmatrix} * \begin{bmatrix} b0 \\ b1 \\ b2 \\ b3 \end{bmatrix} = \begin{bmatrix} \sum y \\ \sum x1y \\ \sum x2y \\ \sum xny \end{bmatrix}$$

$$A*B = C$$

$$A^{-1}A * B = A^{-1}C$$

$$B = A^{-1}C$$

Para obtener la matriz de coeficientes (b0, b1, b2., b3)

Obtenga la matriz inversa se A y multiplique por la matriz C