Tarea 5 (Mínimos Cuadrados)

1. $$f(x|\mu,\sigma) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{\left(\frac{-(x-\mu)^2}{2\sigma^2}\right)}$$

$$A = (x_1, x_2, \ldots, x_n)$$

$$L(\mu,\sigma|A) = \prod_{i=1}^{n} f(x_i|\mu,\sigma)$$

$$L(\mu,\sigma|A) = \prod_{i=1}^{n} \frac{1}{\sqrt{2\pi\sigma^2}} e^{\left(\frac{-(x-\mu)^2}{2\sigma^2}\right)}$$

$$L(\mu,\sigma|A) = \frac{1}{(2\pi\sigma^2)^{n/2}} e^{\left(-\sum_{i=1}^{n} \frac{(x_i-\mu)^2}{2\sigma^2}\right)}$$

$$\ln(L(\mu,\sigma|A)) = -\frac{n}{2}\ln(2\pi\sigma^2) - \sum_{i=1}^{n} \frac{(x_i-\mu)^2}{2\sigma^2}$$

$$\frac{d\ln(L)}{d\mu} = -\sum_{i=1}^{n} \frac{x_i-\mu}{\sigma^2} = 0$$

$$\sum_{i=1}^{n} (x_i-\mu) = 0$$

$$\mu = \frac{1}{n}\sum_{i=1}^{n} x_i$$

$$\frac{d\ln(L)}{d\sigma^2} = \frac{-n}{2\sigma^2} + \sum_{i=1}^{n} \frac{(x_i-\mu)^2}{2\sigma^4} = 0$$

$$-n\sigma^2 + \sum_{i=1}^{n} (x_i-\mu)^2 = 0$$

$$\sigma^2 = \frac{1}{n}\sum_{i=1}^{n} (x_i-\mu)^2$$