7.- c) $\chi^2(\vec{\theta}) = \sum_{i=1}^{n} \left(\frac{y_i - M(x_i, \vec{\theta})}{\sigma_i}\right)^2$; $\sigma_i = 1 \ \forall i$

$$\frac{\partial \chi^2(\vec{\theta})}{\partial \theta_i} = \sum_{i=1}^{n} 2\left(y_i - M(x_i,\vec{\theta})\right)\left(-\frac{\partial M(x_i,\vec{\theta})}{\partial \theta_i}\right)$$

$$= -2\sum_{i=1}^{n}\left(y_i - M(x_i,\vec{\theta})\right)\frac{\partial M(x_i,\vec{\beta})}{\partial \theta_i}$$

d) Por definición del metodo del descenso del gradiente

$$\vec{\theta}_{j+1} = \vec{\theta}_j - \gamma \nabla \chi^2(\vec{\theta}_j)$$

por el item c), $y_i - M(x_i, \vec{\theta}_j)$ es un factor constante que se puede factorizar del vector $\nabla \chi^2(\vec{\theta}_j)$

$$\vec{\theta}_{j+1} = \vec{\theta}_j - \gamma\left(-2\sum_{i=1}^{N}\left(y_i - M(x_i,\vec{\theta}_j)\right)\left[\frac{\partial M(x_i,\vec{\theta}_j)}{\partial \theta_0}, \frac{\partial M(x_i,\vec{\theta}_j)}{\partial \theta_1}, \frac{\partial M(x_i,\vec{\theta}_j)}{\partial \theta_2}\right]\right)$$

De modo que se tiene

$$\vec{\theta}_{j+1} = \vec{\theta}_j - \gamma\left(-2\sum_{i=1}^{n}\left(y_i - M(x_i,\vec{\theta}_j)\right)\nabla M(x_i,\vec{\theta}_j)\right)$$