problem 1

1-a $E_D(\vec{w}) = \frac{1}{2}\sum_{n=1}^{N} r_n (t_n - \vec{w}^T \vec{x}_n)^2$

set=0 $\frac{\partial}{\partial w} E_D(\vec{w}) = -\sum_{n=1}^{N} r_n \left(t_n - \vec{w}^T \vec{x}_n\right) \vec{x}_n = 0$

$$\sum_{n=1}^{N} r_n t_n \vec{x}_n = \left(\sum_{n=1}^{N} r_n \vec{x}_n \vec{x}_n^T\right) \vec{w}$$

$$\vec{w} = \left(\sum_{n=1}^{N} r_n \vec{x}_n \vec{x}_n^T\right)^{-1} \left(\sum_{n=1}^{N} r_n t_n \vec{x}_n\right)$$