1) Recall that in linear regression the objective function is

$$E(w) = \frac{1}{N} \left\| Xw - y \right\|^2$$

and its first-order deriative is

$$\nabla E(w) = \frac{2}{N}(X^T X w - X^T y)$$

Please compute the second-order deriative $\nabla^2 E(w)$

$$\nabla^2 E(w) = \frac{2}{N} X^T X$$