Q6) If we take the first basis function

$$\phi_1(x) = 1$$

and make the other basis functions to simply the ~~entry of input data~~ constant α_1.

$$\Rightarrow \quad A = 1_N$$

$$\Rightarrow \quad \hat{\alpha}_1 = (A^T A)^{-1} A^T y^d$$

$$= \frac{1}{N} (1_N^T) y_o^d$$

$$= \text{avg}(y^d)$$

We have error as

$$e^d = \begin{bmatrix} y_1 - \text{avg}(y^d) \\ y_2 - \text{avg}(y^d) \\ \vdots \\ y^n - \text{avg}(y^d) \end{bmatrix}$$

$$\text{avg}(e^d) = \frac{y_1 + y_2 + \cdots y_n - n\,\text{avg}(y^d)}{n}$$

$$= \text{avg}(y^d) - \text{avg}(y^d)$$

$$= 0$$