Regression solution: simple matrix math $\mathbf{w}^* = \arg\min(\mathbf{H}\mathbf{w} - \mathbf{t})^T(\mathbf{H}\mathbf{w} - \mathbf{t})$

$$\mathbf{w}^* = \arg\min_{\mathbf{w}} \underbrace{(\mathbf{H}\mathbf{w} - \mathbf{t})^T (\mathbf{H}\mathbf{w} - \mathbf{t})}_{\text{residual error}}$$

solution: $\mathbf{w}^* = (\mathbf{H}^{\mathrm{T}}\mathbf{H})^{-1}\mathbf{H}^{\mathrm{T}}\mathbf{t} = \mathbf{A}^{-1}\mathbf{b}$

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where $\mathbf{A} = \mathbf{H}^T \mathbf{H} = \begin{bmatrix} \mathbf{b} \\ \mathbf{b} \end{bmatrix}$ $\mathbf{b} = \mathbf{H}^T \mathbf{t} = \begin{bmatrix} \mathbf{b} \\ \mathbf{c} \end{bmatrix}$

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for k basis functions

k×k matrix k×1 vector