Hint. Suppose that the functions $\varphi_k : [a,b] \to \mathbb{R}, k = 1, \ldots, n$ are linearly independent functions in $C([a,b])$ and $f \in C([a,b])$ is given. The the least squares approximation of f in the subspace spanned by $\{\varphi_1, ..., \varphi_n\}$ is given by

$$f^* = \sum_{j=1}^{n} c_j^* \varphi_j \,,$$

where c_j* satisfy the normal equations, i.e.

$$\sum_{j=1}^{n} (\varphi_j, \varphi_k) c_j^* = (f, \varphi_k) \,, k = 1, ..., n \,.$$

If the functions $\{\varphi_1, ..., \varphi_n\}$ form an orthogonal system, then these constants are denoted by c_k and given by

$$c_k = (f, \varphi_k)/(\varphi_k, \varphi_k) \,, j = 1, \ldots, n \,.$$