$$\min_{f \in \mathcal{F}} \sum (y_i - f(x_i))^2 + \lambda \left(\int f''(x) \right)^2$$

$$\beta_j = \int f_* \varphi_j$$

$$\tilde{\beta}_j = \frac{1}{n} \sum_{i=1}^{n} f_*(X_i) \varphi_j(X_i)$$

$$\hat{\beta}_j = \frac{1}{n} \sum_{i=1}^{n} Y_i \varphi_j(X_i)$$

$$(X^T X)^{-1} X^T Y$$

$$\Phi^T \Phi = n I$$