Ex. 2.7 (forms for linear regression and k-nearest neighbor regression)
To simplify this problem lets begin in the case of simple linear regression where there is only one response y and one predictor x. Then the standard definitions of y and X state that $y^T = (y_1, \dots, y_n)$, and $X^T = \begin{bmatrix} 1 & \cdots & 1 \\ x_1 & \cdots & x_n \end{bmatrix}$.

Part (a): Let's first consider linear regression. We use (2.2) and (2.6), but we avoid just copying the formulas blindly. We have $\hat{\beta} = \left(X^T X\right)^{-1} X^T y$, and then set

$$\hat{f}(x_0) = [x_0 \ 1]\hat{\beta} = [x_0 \ 1]\left(X^T X\right)^{-1} X^T y.$$

In terms of the notation of the question,

$$\ell_i(x_0; \mathcal{X}) = [x_0 \ 1]\left(X^T X\right)^{-1} \begin{bmatrix} 1 \\ x_i \end{bmatrix}$$

for each i with $1 \leq i \leq n$.

More explicitly, $X^T X = \begin{bmatrix} n & \sum x_i \\ \sum x_i & \sum x_i^2 \end{bmatrix}$ which has determinant $(n-1)\sum_i x_i^2 - 2n \sum_{i<j} x_i x_j$.

This allows us to calculate $\left(X^T X\right)^{-1}$ and $\ell_i(x_0; \mathcal{X})$ even more explicitly if we really want to. In the case of k-nearest neighbor regression $\ell_i(x_0; \mathcal{X})$ is equal to $1/k$ if x_i is one of the nearest k points and 0 otherwise.