Ex 6.6

As stated in the book, the following eqn,

$$f(X) = \alpha(Z) + \beta_1(Z)X_1 + \ldots + \beta_q(Z)X_q$$

can be fit as locally weighted least squares e.g.

$$\underset{\alpha(z_0),\beta(z_0)}{Min} \sum_{i=1}^{N} K_\lambda(z_0, z_i)\left(y_i - \alpha(z_0) - x_{1i}\beta_1(z_0) - \ldots - x_{qi}\beta_q(z_0)\right). \quad (*)$$

The key decision here is the choice of Kernel K_λ. For example, if Z was time and we wish to model a time series where effect decays into the past we could constrain this in the Kernel and then fit (*) as usual. However, for the aorta data in Figure 6.11, we might use the Nadaraya-Watson Kernel with Z representing distance down the aorta and again fit (*) as usual.