

Homework problem 1, due 11/25

Assume we have iid data $\{(x_i, y_i)\}_{i=1}^n$, where $y_i = g(x_i) + \epsilon_i$. Suppose that $g(x)$ is approximated locally by a linear polynomial with kernel weight function $K_h(x - x_i)$.

- fitting criterion: in a small region around x_0 ,
 $g(x) \approx a_0 + b_0(x - x_0)$,

$$(\hat{a}_0, \hat{b}_0) = \arg \min_{a_0, b_0} \sum_{i=1}^n (y_i - a_0 - b_0(x_i - x_0))^2 w_i$$

- Kernel weights: $w_i = K_h(x_0 - x_i) / \sum_{i=1}^n K_h(x_0 - x_i)$.

Derive the local linear estimator $\hat{g}(x)$.