4.5) 1. $x \in [\xi_1, \xi_2)$

$$\Rightarrow f(x;\beta) = \hat\beta_1 + \hat\beta_2 x + \hat\beta_3 x^2 + \hat\beta_4 x^3 + (x-\xi_j)^3$$

2. $$f'(x;\beta) = \hat\beta_2 + 2\hat\beta_3 x + 3\hat\beta_4 x^2 + 3\sum_{j=1}^{K} \hat\beta_{j+4}(x-\xi_j)^2 I\{x>\xi_j\}$$

$$f'(\xi_j^+) - f'(\xi_j^-) = 3\hat\beta_{j+4}(\xi_j^+ - \xi_j)^2 - 3\hat\beta_{j+4}\cdot 0 = \underline{0}$$

$$f''(x) = 2\hat\beta_3 + 6\hat\beta_4 x + 6\sum_{j=1}^{K}\hat\beta_{j+4}(x-\xi_j)_+$$

$$f''(\xi_j^+) - f''(\xi_j^-) = 6\hat\beta_{j+4}(\xi_j^+ - \xi_j) - 0 = \underline{0}$$

3. $$f^{(3)}(x) = 6\hat\beta_4 + 6\sum_{j=1}^{K}\hat\beta_{j+4} I\{x>\xi_j\}$$

$\Rightarrow$ jumps.

mar. 4-08:14

ISLR

9.2) a) $g = \underline{0}$

b) $g' = 0 \Rightarrow \underline{g = k}$

c) $g'' = 0 \Rightarrow g' = k \Rightarrow \underline{g = ax + b}$

d) $g''' = 0 \Rightarrow g'' = k \Rightarrow g' = ax + b \Rightarrow \underline{g = cx^2 + dx + e}$

e) $g(x_i) = y_i$

mar. 4-08:41

9.5

a) $\hat g_2$ smallest RSS

b) Depends on $\omega$.

c) $\underline{g_1 = g_2}$

mar. 4-08:53