

To obtain the lowess estimates  $\text{lowess} \pm \text{SD}$ :

**Notation:** To distinguish estimates from parameters or true values, we'll use a hat (^) over estimates.

1. Smooth to get the lowess estimate  $\hat{E}(y|x)$  of  $E(y|x)$ .

2. Let

$$\hat{e}^2 = [y - \hat{E}(y|x)]^2 \text{ -- the "squared residual"}$$

It's an estimate of  $[y - E(y|x)]^2$

Recalling the definition of Var, we can consider

$$E(\hat{e}^2|x)$$

as an estimate of  $\text{Var}(y|x)$ .

3. Use smoothing to get an estimate  $\hat{E}(\hat{e}^2|x)$  of  $E(\hat{e}^2|x)$

4.  $\widehat{\text{SD}} = \sqrt{\hat{E}(\hat{e}^2|x)}$