## Solution

Let  $ilde{m{y}}$  be equal to  $m{y}$  with  $y_i$  replaced by  $\hat{y}_i^{-i}$ . Then  $m{H} ilde{m{y}}=\hat{m{y}}^{-i}$ , and

$$\hat{oldsymbol{y}} - \hat{oldsymbol{y}}^{-i} = oldsymbol{H}(oldsymbol{y} - ilde{oldsymbol{y}}) = oldsymbol{H}(y_i - \hat{y}_i^{-i})oldsymbol{e_i}$$

and looking at the  $\emph{i}$ -th entry we find

$$\hat{y}_i - \hat{y}_i^{-i} = h_{ii}(y_i - \hat{y}_i^{-i}).$$

or equivalently

$$(y_i - \hat{y}_i^{-i})(1 - h_{ii}) = y_i - \hat{y}_i.$$

Then we find

$$p\hat{\sigma}^2D_i = |\hat{m{y}} - \hat{m{y}}^{-i}|^2 = (y_i - \hat{y}_i^{-i})^2m{e_i}^ op m{H}^2m{e_i} = rac{h_{ii}}{(1-h_{ii})^2}r_i^2 = rac{h_{ii}}{1-h_{ii}}\hat{\sigma}^2r_{0i}^2$$

and done. One sees that Cook's distance statistic  $D_i$  is unusually large at high leverage points with large residuals.

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