Problem 8.6. You should do this problem using smoothing splines (section 5.4). If you use a software package to do parts of this problem, please explain clearly what the package is doing and the rationale behind it.

Using smoothing splines:

(a) You can use (8.21) to get an estimate of $\hat{\sigma}$. But note that this will not represent the typical error bars you will expect around your curve.

(b) The Bayesian method will require you to use a large matrix $H$ (corresponding to the large number of smoothing spline basis elements).

(c) You can bootstrap 100 samples and repeat the procedure in (a) on each one to get your estimates $\hat{f}^*$ for each bootstrap. How can you use these to obtain a confidence interval?

Also try to (d) use cross-validation to estimate the error of the smoothing spline estimate in part (a), and also estimate this error using a bagging version of this estimator.

Please show your source code/commands as well as results.