Concept Question 10-16: Why is shrinkage, in addition to thresholding, needed for noise reduction?

The combination of thresholding and shrinkage minimizes the LASSO functional given by Eq. (10.163):

$$\Lambda = \frac{1}{2} \underbrace{\sum_{n=0}^{N-1} (y[n] - x[n])^2}_{\text{fidelity to data } y[n]} + \lambda \underbrace{\sum_{n=0}^{N-1} |x[n]|}_{\text{sparsity}}. \qquad (10.163)$$

Minimizing this functional results in sparse signals. The wavelet transform of many real-world signals is sparse.