

HW for 2018-06-26

(due: 2018-07-02)

1: Least squares Lebesgue Consider again the Chebyshev fitting problem

$$\hat{f}(x) = \sum_{j=0}^{n-1} c_j T_j(x)$$

where c_j is chosen to minimize $\|Ac - f_X\|^2$ where $a_{ij} = T_j(x_i)$. Argue that the Lebesgue constant for this problem is at most $n\|A^\dagger\|_\infty$. On a semi-logarithmic plot, show $n\|A^\dagger\|_\infty$ versus n for the case of n evenly spaced grid points in the interval $[-1, 1]$ and $n = km$ for $k = 1, 2, 3$.

2: Splines For 10 points evenly spaced in $[-1, 1]$, set up the cubic spline system in the form described at the end of the notes from 6/26 to approximate $f(x) = \sin(2\pi x)$, and plot the approximation error.