HOMEWORK 17

Due Date: Wednesday, June 30

1. Use the Gram-Schmidt process to orthogonalize the set $\{1, x, x^2\}$ on the interval $(0, \infty)$ with respect to the weight function $w(x) = e^{-x}$. (The set of polynomials you obtain are called *Laguerre polynomials*.)

2. Find the linear least squares polynomial approximation to $f(x) = e^x$ on the interval $[0, 2]$ with weight $w(x) = 1$.

3. (Optional, not graded) Choose your own function $f(x)$, interval $[a, b]$, weight $w(x)$, and approximation space V_n, and solve the least-squares problem, i.e. find $v \in V_n$ such that $\|f - v\|_{2,w}$ is minimized.