

**AMSC/CMSC 460: HW #8**  
**Due: Tuesday 4/10/18 (in class)**

Please submit the solution to at least one problem in LaTeX.

1. Use the Gram-Schmidt process to construct the first three orthonormal polynomials for the following intervals and weights
  - (a)  $w(x) \equiv 1$ ,  $[-1, 3]$ .
  - (b)  $w(x) = x$ ,  $[-2, 2]$ .
2. Find the linear least squares polynomial approximation to  $f(x)$  in the indicated interval if
  - (a)  $f(x) = x^2 - 2x + 1$  on  $[0, 1]$
  - (b)  $f(x) = \frac{1}{2} \sin x + \frac{1}{4} \cos 2x$  on  $[-1, 1]$
3. Find the quadratic least squares polynomial approximations to the functions and intervals in the previous problem.
4. Find the first two orthonormal polynomials (polynomials of degree 0 and degree 1) for the following weight functions  $w(x)$  on the indicated intervals  $[a, b]$ :
  - (a)  $w(x) = x^2$ ,  $0 \leq x \leq 1$ .
  - (b)  $w(x) = \sqrt{1 - x^2}$ ,  $-1 \leq x \leq 1$ .