

**AMSC/CMSC 460: HW #10**  
**Due: Tuesday 4/23/19 (in class)**

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

1. Use the method of undetermined coefficients to derive a quadrature of the form

$$\int_0^1 f(x)dx \approx Af(1/3) + Bf(3/4).$$

Transform this quadrature to a quadrature over  $[a, b]$ . Apply this result to evaluate  $\int_0^\pi \sin(x)$ . Compare the result of the approximation with the exact value of the integral.

2. Find a quadrature of the form

$$\int_0^1 f(x)dx \approx A_0f(0) + A_1f(1)$$

that is exact for all functions of the form  $f(x) = ae^{-x} + b \cos(\pi x/2)$ .

3. Find a quadrature of the form

$$\int_0^2 f(x)dx \approx Af(0) + Bf(2/3) + Cf(2).$$

Transform this quadrature to one for integration over  $[a, b]$ .

4. Derive a formula for approximating  $\int_1^2 f(x)dx$ , in terms of  $f(0), f(1), f(3)$ . It should be exact for all polynomials of degree  $\leq 2$ .