Homework 3

MATH 578 Numerical Analysis
Due in class Thurs Oct 22

October 16, 2015

Problems from Textbook

1. 10.2
2. 10.18
3. 13.7
4. 15.9
5. 15.13

Additional Problems (reference: Burden-Faires)

6. Use divided differences to construct interpolating polynomials of degree one, two, and three from the data (starting from the left), $f(0) = 3, f(1) = 5, f(2) = -1, f(3) = 2$. Evaluate $p(.05)$ for each polynomial.
7. Approximate $\int_{.5}^{1} x^4\,dx$ using the trapezoidal rule.
8. Use the composite trapezoidal rule with $n = 3$ intervals to approximate $\int_1^2 x \ln x\,dx$.
9. Apply the power method to the matrix A, below, to find the dominant eigenvector/eigenvalue pair. Start from $x^0 = (1, 1, 1)$.

$$A = \begin{bmatrix} -4 & 14 & 0 \\ -5 & 13 & 0 \\ -1 & 0 & 0 \end{bmatrix}$$

   (Note: A has eigenvalues $6, 3, 1$.)
10. Apply Aitken's delta squared method, `https://en.wikipedia.org/wiki/Aitken's_delta-squared_process` to the sequence of approximate eigenvalues from the previous problem. Is the accuracy improved?
11. Apply the inverse power method with $\mu = 3.5$ to find the second eigenvalue/eigenvector pair of A, where A is the matrix in the earlier problem.