

NUMERICAL ANALYSIS: 2014 GRADUATION TEST

Problem 1. Make the divided difference table for the following data points and give the Lagrange interpolating polynomial:

$$(-\pi, 1), (-\pi/2, -1), (0, 0), (\pi/2, 2), (\pi, 3).$$

Problem 2. Write down the midpoint rule and approximate the following integral by the midpoint rule, and give its error bound:

$$\int_0^{\pi/2} x \cos x \, dx.$$

Problem 3. Compute the following norms: $\|A\|_\infty$, $\|A\|_1$, $\|A\|_2$ for the matrix

$$A = \begin{pmatrix} 7 & 5 & 1 \\ -1 & 5 & 0 \\ 1 & 0 & 5 \end{pmatrix}.$$