

NUMERICAL ANALYSIS: GRADUATION TEST

Problem 1. Construct the Lagrange interpolating polynomial for the following points:

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

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

$$\int_0^{\pi/4} x \cos x \, dx.$$

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

$$A = \begin{pmatrix} 5 & 2 & 1 \\ 2 & 5 & 0 \\ 1 & 0 & 5 \end{pmatrix}.$$