

## NUMERICAL ANALYSIS: 2020 GRADUATION TEST

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

$$(1, 1), (2, 5), (3, 0), (4, 7), (5, 1).$$

**Problem 2.** Write down the trapezoidal rule and approximate the following integral, 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

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