Tsinghua University

Numerical Analysis

Fall 2024

Homework 1

Lin Zejin 2025 年 4 月 14 日

- **Collaborators:** I finish this homework by myself.

Problem 2

Problem 3

Problem 5 e^x 的 Taylor 展开式为

$$e^x = \sum_{j=0}^{\infty} \frac{1}{j!} x^j$$

若 $\frac{P(x)}{Q(x)}$ 是 Pade 逼近，则

$$p_0 = 1$$

$$q_1 + 1 - p_1 = 0$$

$$q_2 + q_1 + \frac{1}{2} q_0 - p_2 = 0$$

$$q_2 + \frac{1}{2} q_1 + \frac{1}{6} q_0 = 0$$

$$\frac{1}{2} q_2 + \frac{1}{6} q_1 + \frac{1}{24} q_0 = 0$$

不妨 $q_2 = 1$, 解得

$$q_1 = -6, q_0 = 12, p_2 = 1, p_1 = -5$$

故 Pade 逼近为

$$\frac{x^2 - 5x + 1}{x^2 - 6x + 12}$$