

NMA – homework from week 9

Consider mixed problem for the heat equation

$$\begin{aligned}\frac{\partial u}{\partial t} &= \frac{1}{2} \frac{\partial^2 u}{\partial x^2} + x + 2t \quad \text{on } \Omega = (0, 5) \times (0, 10) \\ u(0, t) &= 3t, \quad u(5, t) = 2t + 20 \quad \text{for } t \in \langle 0, 10 \rangle \\ u(x, 0) &= 4x \quad \text{for } x \in \langle 0, 5 \rangle\end{aligned}$$

- a) Check that for the choice of step $h = 1$ in the x-direction and time-step $\tau = 0.5$, the explicit scheme is stable.
- b) Compute approximate value of $u(4, 1)$ using the explicit scheme with $h = 1$, $\tau = 0.5$.