

Übungen zu **Numerik (für Geowissenschaftler)**
Blatt 9

Ü1 (*Estimation*) Find the Gerschgorin-circles of the matrices

$$1.) A = \begin{bmatrix} 3 & 4 & 0 \\ 0 & 3 & -2 \\ 2 & 2 & -9 \end{bmatrix}$$

$$2.) B = \begin{bmatrix} 11 & -3 & 5 & -1 \\ 9 & 11 & -13 & 1 \\ -1 & 2 & -21 & 3 \\ -2 & 3 & -2 & 31 \end{bmatrix}$$

and their transposes.

Ü2 (*Consistency Order*) Determine the order of the local discretization error $\epsilon(h)$ of the trapezoidal rule

$$u(t+h) = u(t) + \frac{1}{2}h[f(t, u(t)) + f(t+h, u(t+h))]$$

Ü3 (*Programming*) Given the initial value problem

$$u'(t) = 1 + (u(t))^2, \quad u(0) = 0$$

Solve it numerically with the `matlab` routine `ode23` (and / or others).
Compare with the exact solution.