TMA4329 Intro til
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ving 6

[S]=T. Sauer, Numerical Analysis, Second International Edition, Pearson, 2014

"Teorioppgaver"

1 Oppgave 6.1.3 (b), (e), s. 291, [S]

2 Oppgave 6.1.4 (a), (b), s. 291, [S]

3 Oppgave 6.1.9, s. 292, [S]

4 Oppgave 6.1.10, s. 292, [S]

5 Oppgave 6.1.11, s. 292, [S]

6 Oppgave 6.2.2, s. 302, [S]

7 Oppgave 6.3.3, s. 302, [S]

8 Consider the initial value problem

$$y' = \lambda y, \qquad t > 0,$$
$$y(0) = y_0,$$

where $\lambda \in \mathbb{C}$. Its solution is $y(t) = y_0 \exp(\lambda t)$.

Suppose that we use a numerical method (such as e.g. forward Euler or explicit trapezoid) to solve this problem starting from a point $w_0 = y_0$. *The stability region for the method is a set of points $z = \lambda h$ in the complex plane, such that the numerical solution $(w_0, w_1, \dots)$ stays bounded* (i.e., $\exists C > 0 : \forall i, |w_i| \leq C$).

Find the stability region for (a) forward Euler method; (b) explicit Trapezoid method.

"Computeroppgaver"

9 Oppgave 6.1.5, s. 293, [S]

10 Repeat the previous exercise, but use the explicit trapezoid method instead.

11 Oppgave 6.3.10, s. 314, [S]. Use the initial conditions specified in the book but different masses: $m_1 = m_3 = 0.03$, $m_2 = 0.3$. Use the explicit Trapezoid method.

12 Oppgave 6.3.11, s. 314, [S]. Use the explicit Trapezoid method.