

TMA 4115 Matematikk 3

Lecture 7 for MTFYMA

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Last lecture: Solved homogeneous linear equations with constant coefficients

$$y'' + py' + qy = 0$$

Strategy

- Construct characteristic polynomial
- calculate characteristic roots
- obtain fundamental system/general solution (Cases: 2 real roots, 2 complex roots, repeated root)

If you are supposed to solve an initial value problem (IVP) then also

- insert general solution in initial value equation
- calculate constants for the unique solution

New in this lecture: What to do with inhomogeneous systems.

Method of undetermined coefficients

Often the forcing term of an inhomogeneous equation from physics is of the form

$$e^{at}, \cos(at), \sin(at) \text{ or } \sum_{n=0}^k a_n t^n \text{ (Polynomial)}$$

These forcing terms reproduce under differentiation!

Guideline for the “Method of undetermined coefficients”

If the form of the forcing term f replicates under differentiation, look for a solution with the same form.