

31	32	33	34	35	Σ

Worksheet 7
Advanced Mathematics II for Mechanical Engineering

Problem 31: Determine the general solution of the differential equation:

$$y'''(x) + 3y''(x) + 4y'(x) + 2y(x) = 0$$

using the following ansatz $y(x) = e^{\lambda x}$, $\lambda \in \mathbb{C}$.

Problem 32: Find the general solution of the following 4th order homogeneous linear differential equation:

$$u^{(IV)}(x) - 3u''(x) - 4u(x) = 0, \quad x \in \mathbb{R},$$

Solve the corresponding initial value problem given by

$$u(0) = 12, \quad u'(0) = 0, \quad u''(0) = 33, \quad u'''(0) = -10.$$

Problem 33: Determine the general solution of

$$x^3 y'''(x) - 8x^2 y''(x) + 26xy'(x) - 36y(x) = 0$$

using the ansatz $y(x) = x^k$.

Aufgabe 34: Determine a fundamental system for the 3rd order Euler differential equation

$$u'''(x) - \frac{2}{x}u''(x) + \frac{5}{x^2}u'(x) - \frac{5}{x^3}u(x) = 0, \quad x \in (0, \infty),$$

by means of the ansatz $u(x) = x^\lambda$.

Problem 35: Show that $u(x) = e^{x^2}$ solves

$$u''(x) - 2xu'(x) - 2u(x) = 0, \quad x \in (0, \infty).$$

Using the method of reduction of order, determine another solution u_2 .

Due date: Monday, June 06, 2005, 1:00 pm (in the slots outside room 208.1 of the Mathematics Building)