Fachbereich Mathematik der Universität Hamburg **WiSe 2023/24**
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Differential Equations I
for Students of Engineering Sciences
Sheet 5, Exercise class

Exercise 1: Determine the general solutions of the following linear differential equations

a) $u^{(3)} - 3\,u' - 2\,u = e^{-2t}\,.$

b) $u^{(3)} - 3\,u' - 2\,u = e^{2t}\,.$

c) $u^{(3)} - 3\,u' - 2\,u = te^{-2t}\,.$

d) $u^{(3)} - 3\,u' - 2\,u = 7e^{2t} - 5\,e^{-2t}\,.$

Hint: For the particular solution of the inhomogeneous problem you may use a special ansatz.

Exercise 2)

a) Determine a real representation of the general solution of the differential equation

$$u^{(3)}(t) + u''(t) + 3u'(t) - 5u(t) = 0\,.$$

b) Determine the general solutions of the differential equations :

i) $u^{(3)}(t) + u''(t) + 3u'(t) - 5u(t) = 10,$ **ii)** $u^{(3)}(t) + u''(t) + 3u'(t) - 5u(t) = e^{t}.$

Dates of classes: 11-15.12.2023