Fachbereich Mathematik der Universität Hamburg **Winter Term 2022/23**
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Differential Equations I
for Students of Engineering Sciences

Sheet 2, Exercise class

Exercise 1: *(Separation of variables)*

a) Determine the general solution of the following first order differential equations.

$$\text{i)} \quad y' = -x^3 \cdot y^2 + 2x \cdot y^2 \,,$$

$$\text{ii)} \quad 2y \cdot y' = -(1+y^2) \cdot x \,.$$

b) What is the solution of i) and ii) respectively under the requirement $y(0) = 2$?

Exercise 2: *(Linear differential equations)*

Determine the general solutions of the following first order differential equations.

$$\text{i)} \quad y' - 4\,y = t, \qquad \text{ii)} \quad y' - 4\,y = 5e^{4t} \,,$$

$$\text{iii)} \quad y' - y = \cos t \,, \qquad \text{iv)} \quad y' + 4t\,y = e^{-2t^2} \cos(t) \,.$$

Dates of classes: 01.11.- 04.11.2022