Universität Duisburg-Essen Computational Mechanics Fakultät für Mathematik Summer Term 2013 04/11/2013

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Advanced Numerical Methods – Homework 1.

Exercise 1

Give all solutions to the ODE

$$y' = \frac{1}{x}y.$$

Exercise 2 Solve the initial value problem

$$y' = 1 + y^2, \qquad y(0) = 0.$$

Exercise 3

$$y' = \frac{1}{x}y + \frac{1}{y}.$$

and draw different solutions in a diagram. Indicate the corresponding direction field in your drawing as well.

Hint: Substitute  $u(x) = \frac{y(x)}{x}$ .