Differential Equations I for Students of Engineering Sciences

Sheet 1 (in-class)

Exercise 1:

a) Solve the differential equation
$$y'e^{-x} = y^2 + 9$$
by separation of variables and check that the computed function is a solution.

b) Solve the differential equation by variation of constants
$$\dot{y} + 2y = 3 + 6t.$$

Exercise 2:

a) Solve the following differential equation by substitution
$$x^2 y' - y^2 - xy + x^2 = 0$$
for $x \neq 0$.

b) Solve the following initial value problem with the Bernoulli differential equation
$$y' - \frac{y}{3} - \frac{y^4}{3} = 0 \quad \text{and} \quad y(0) = 1.$$
Is there a solution for all x?

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