

Homework Assignment 4 in Differential Equations, MATH308-SPRING 2015

due February 9, 2012

Topics covered : *existence and uniqueness of solutions for linear equations (section 2.4); exact equations (sections 2.6)*

1. Consider the differential equation

$$(t^2 + 7t + 10)y' + (t - 2)y = te^t.$$

In each of the following three items determine (without solving the equation) an interval in which the solution with given initial condition is certain to exist if the initial condition is

- (a) $y(-6) = -100$ (b) $y(-3) = -100$ (c) $y(0) = 0$.

2. Find the value of parameter a for which the differential equation

$$(ax^3y - 5e^y)\frac{dy}{dx} = (x^2y^2 + \sin x)$$

is exact, and then find the solution satisfying the initial condition $y(\pi) = 0$ in the case of this value of a .

3. For the differential equation

$$(3xy - y^2)dx + x(x - y)dy = 0$$

find the integrating factor depending on x only to make it exact and then solve the equation