

Millersville University
Department of Mathematics
MATH 365, Ordinary Differential Equations, Homework 1
January 16, 2004

Please answer the following questions. Answers without justifying work will receive no credit. Partial credit will be given as appropriate, do not leave any problem blank. Each problem is worth 10 points. Your completed assignment is due at class time on Wednesday, January 21, 2004.

1. Solve the following ordinary differential equations and initial value problems.

(a) $y' + \frac{y}{t} = 1$; assume $t > 0$.

(b) $ty' + 3y = t^2$; assume $t > 0$.

(c) $I' + 3I = e^{-2t}$; $I(0) = 5$

(d) $y' + \frac{10y}{2t+5} = 10$; $y(0) = 0$

2. Consider the nonlinear differential equation

$$y' + p(t)y = q(t)y \ln y.$$

(a) Assuming that $y > 0$ show that the nonlinear ODE can be converted into a first order linear equation in the variable v if we make the change of variable $v = \ln y$.

(b) Use the change of variable described above to solve the following ODE for $y(t)$. You may assume that $t > 0$.

$$ty' = 2t^2y + y \ln y$$