

Millersville University
Department of Mathematics

Name _____

MATH 365, *Ordinary Differential Equations*, Homework 04
February 6, 2009

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 Monday, February 9, 2009.

1. Show that the following first-order ordinary differential equations are exact and find their solutions in implicit form.

(a) $\cos t \cos^2 y \, dt - \sin t \sin 2y \, dy = 0$

(b) $(2y e^{2t} + 2t \cos y) \, dt + (e^{2t} - t^2 \sin y) \, dy = 0$

2. Show that the following first-order ordinary differential equations are not exact, find integrating factors which make them exact, and find their solutions in implicit form.

(a) $\cos t \cos y dt - 2 \sin t \sin y dy = 0$

$$(b) (e^t + t e^y) dt + t e^y dy = 0$$

3. Calculate the first four terms of the sequence of successive approximations to the initial value problem

$$\begin{aligned}\frac{dy}{dt} &= t^2 + y^2 \\ y(0) &= 0.\end{aligned}$$