

Millersville University  
Department of Mathematics  
MATH 365, *Ordinary Differential Equations*, Homework 04  
September 17, 2008

Name \_\_\_\_\_

Answer the following questions by solving the appropriate first order differential equations. 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 Friday, September 19, 2008.

1. Show the following equation is exact and find its general solution.

$$\left( \frac{y}{(t+y)^2} - 1 \right) dt + \left( 1 - \frac{t}{(t+y)^2} \right) dy = 0$$

2. Determine the most general form of the function  $N(t, y)$  such that

$$(y \sin t + t^2 y - t \sec y) dt + N(t, y) dy = 0$$

is exact.

3. Show that in general the ODE

$$yf(ty) dt + tg(ty) dy = 0$$

is not exact, but that it becomes exact upon multiplying by

$$\mu(t, y) = \frac{1}{ty[f(ty) - g(ty)]}.$$

4. Solve the following initial value problem.

$$\frac{dy}{dt} = \frac{\sin y}{t \cos y - \sin^2 y}$$

$$y(0) = \frac{\pi}{2}$$

5. Solve the following ordinary differential equation.

$$\frac{dy}{dt} = \frac{3y^2 \cot t + \sin t \cos t}{2y}$$