

Millersville University
Department of Mathematics

Name _____

MATH 365, *Ordinary Differential Equations*, Homework 05
October 1, 2008

Answer the following questions by solving the appropriate second 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, October 3, 2008.

1. Solve each of the following ODEs and IVPs.

(a) $y'' - 3y' + 2y = 0$

(b) $y'' + 2y' + 5y = 0$

(c) $y'' - 4y' + 4y = 0, y(0) = 2, y'(0) = 1.$

(d) $4y'' - 4y' + y = 0, y(1) = 0, y'(1) = 1.$

2. Show that $y_1(t) = \cos t$ is a solution to the following ODE

$$y'' + (\cos t)y' + (1 + \sin t)y = 0$$

and find a second, linearly independent solution.

3. Consider the IVP

$$\begin{aligned}y'' + 2ay' + (a^2 + 1)y &= 0 \\y(0) &= 1 \\y'(0) &= -1\end{aligned}$$

If $a = \pi$ find the smallest value of T such that $|y(t)| < 1/100$ for all $t > T$.

4. Find the general form of the Wronskian for the ODE

$$t^2 y'' + t \cos(\ln t) y' + (t^2 - n^2) y = 0$$

where $n \in \mathbb{N}$.