Be sure this exam has 6 pages including the cover

The University of British Columbia

MATH 256, Section 103

Midterm Exam I – October 3, 2014

Name _____   Signature _____

Student Number _____

This exam consists of **4** questions. No notes. Simple numerics calculators are allowed. Write your answer in the blank page provided.

Problem	max score	score
1.	20	
2.	20	
3.	20	
4.	40	
total	100	

(20 points)   1. Solve the following ordinary differential equation

$$ty' + 2y = -4t^3 y^3, \qquad y(1) = 1$$

and state the Interval of Existence.

(20 points)   2. Solve the following ordinary differential equation

$$y' = \frac{t^2}{y^2 - 1}, \quad y(0) = 0$$

and state the Interval of Existence.

(20 points) 3. Use the method of undetermined coefficients to find the general solution of

$$y'' - 6y' + 9y = te^{3t} - \sin(3t)$$

(40 points)   4. Consider the following differential equation

$$ty'' - (1+t)y' + y = 0, t > 0$$

(10 points)   (a) Find the Wronskian $W(t)$.

(10 points)   (b) Let $y_1(t) = e^t$. Use the reduction of order to find y_2.

(20 points)   (c) Use the method of variation of parameters to solve the inhomogeneous problem

$$ty'' - (1+t)y' + y = t^2 e^{-t}.$$

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