

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	

1. Each candidate should be prepared to produce his library/AMS card upon request.

2. Read and observe the following rules:

No candidate shall be permitted to enter the examination room after the expiration of one half hour, or to leave during the first half hour of the examination.

Candidates are not permitted to ask questions of the invigilators, except in cases of supposed errors or ambiguities in examination questions.

CAUTION - Candidates guilty of any of the following or similar practices shall be immediately dismissed from the examination and shall be liable to disciplinary action.

(a) Making use of any books, papers or memoranda, other than those authorized by the examiners.

(b) Speaking or communicating with other candidates.

(c) Purposely exposing written papers to the view of other candidates. The plea of accident or forgetfulness shall not be received.

3. Smoking is not permitted during examinations.

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

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

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

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

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