

CONCORDIA UNIVERSITY  
FACULTY OF ENGINEERING AND COMPUTER SCIENCE  
DEPARTMENT OF MECHANICAL AND INDUSTRIAL ENGINEERING  
APPLIED ORDINARY DIFFERENTIAL EQUATIONS - ENGR 213/4  
2<sup>nd</sup> MID-TERM EXAMINATION (WINTER 2013)

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This is a closed book exam. Solve all questions. Only faculty approved calculators are allowed. Good luck!

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**PROBLEM No. 1.** Solve the IVP:

$$y'' + 6y' - 7y = 0, \quad \text{subject to the initial conditions: } y(0) = 5; y'(0) = -3.$$

**PROBLEM No. 2.** Solve the following differential equation by the method of undetermined coefficients:

$$y'' + 6y' + 9y = 27x + 16e^{-2x}$$

**PROBLEM No. 3.** Solve the following differential equation by the method of variation of parameters:

$$y'' + y = \sin^2 x$$

**PROBLEM No. 4.** Solve the following Cauchy equation:

$$x^2 y'' + 5xy' + 12y = 0$$