Math 2C03: Quiz #3 Information

QUIZ: MONDAY, JULY 13TH, 7PM (FIRST 10 MINUTES OF CLASS)

McMaster University

Potential Quiz Questions:

Your quiz on Monday will consist of one or two of the questions listed below.

1. (a) State the Existence/Uniqueness Theorem for \( n \)th-order linear initial value problems.
   (b) Consider the differential equation \((x^2 - 1)y'' + 3xy' + \cos(x)y = e^t\). Give a set of initial conditions and an interval where the solution is guaranteed to be unique.
   (c) Give a set of initial conditions for \((x^2 - 1)y'' + 3xy' + \cos(x)y = e^t\) where the assumptions of the theorem fail. What does this tell us about existence/uniqueness?

2. (a) What is a fundamental set of solutions?
   (b) Suppose \( f_1, f_2, \) and \( f_3 \) are solutions to a second-order linear homogeneous differential equation. Is \( \{f_1, f_2, f_3\} \) a fundamental set of solutions? Why or why not?

3. (a) Give an example of two functions which are linearly independent. Explain why they’re linearly independent.
   (b) Give an example of two function which are linearly dependent. Explain why they’re linearly dependent.

4. Suppose you’re given a third-order linear homogeneous differential equation with constant coefficients and its auxiliary equation has one distinct real root and a pair of complex roots. What must its general solution look like?

5. Which types of equations can be solved using undetermined coefficients (annihilator approach)?

6. Describe how you would find the general solution to a Cauchy-Euler equation.