

# Math 2C03: Assignment #2

## Due: Friday, July 3rd

McMaster University

### Part I: Online

The online portion of your assignment is available on WeBWork.

### Part II: Written

Please deposit the written part of this assignment in the course locker (basement of HH) by 2pm on the due date.

If you are unable to make it to campus, I will accept online submissions: either TeX your assignment OR *scan* your handwritten assignment. (Please do not take a photo, because it will be too difficult to read). Submit your file as a PDF via email, making the title your LastName\_FirstName\_Assignment2.

### Questions:

Answer each question fully, explaining all reasons. If you use a Theorem, explain why you are allowed to use it (i.e. why are the assumptions of the theorem satisfied?)

1. (4ts) Consider the initial value problem  $2y' + 8xy = x^3e^{x^2}$ ,  $y(0) = 2$ . Without solving this IVP, explain why a solution exists. Can there exist more than one solution to this IVP on a given interval? Explain.
2. (2pts) Consider the first-order differential equation  $(y')^2 + 8 = 0$ . Does this equation possess any real solutions? i.e. Can there exist a real-valued function  $y = \phi(x)$  which satisfies this DE on some interval? Explain.
3. (4pts) Suppose you are given a first-order differential equation  $y' = f(x, y)$ , which satisfies the hypotheses of Theorem 1.2.1 in some rectangular region  $R$ . Could two different solution curves in its 1-parameter family of solutions intersect at a point in  $R$ ? Why or why not?