

Due November 18, 2010

MTH 2140 Session 02 Quiz 3

Instructions: This is a self-scheduled quiz. You can work for as long as you like, but you can't take breaks. You are not allowed to work in groups or discuss problems with other people and you are not allowed to use notes, books, web browsers etc.

After you have gotten as far as you can in a closed-book environment, you can change pen color and work in an open notes, open book, open internet environment for half credit.

Please place the quiz in my mailbox (in MH250) or in the box outside of my office (MH 257) sometime before Thursday at 5 PM.

1. Consider the differential equation

$$\frac{d^3}{dt^3}x - \frac{d}{dt}x = e^{\mu t}$$

where μ is a real number.

- When it exists, find a particular solution of the form $x(t) = Ce^{\mu t}$ for some constant C ¹.
- For what values of μ does such a solution exist?

2. Solve the initial value problem

$$\begin{cases} \dot{x} = (1-t)x + e^{\frac{-t^2}{2}} \\ x(0) = 1 \end{cases}$$

¹the constant C in the particular solution is often called the *gain*