Math 242, Exam 3, Fall 2012

You should KEEP this piece of paper. Write everything on the blank paper provided. If possible: turn the problems in order (use as much paper as necessary), use only one side of each piece of paper, and leave 1 square inch in the upper left hand corner for the staple. If you forget some of these requests, don't worry about it – I will still grade your exam.

The exam is worth 50 points. SHOW your work. $\boxed{\textit{CIRCLE}}$ your answer. **CHECK** your answer whenever possible.

Nothing may be on your desk except things that came from me. In particular, **no Calculators or Cell phones** may be on your desk.

Your work must be coherent and correct.

The solutions will be posted later today.

1. (13 points) Find the general solution of $y'' + 2y' + y = xe^{-x}$. Express your answer in the form $y(x)$. **Check your answer.**

2. (13 points) The Initial Value Problem

$$x'' + 2x' + 5x = 0, \quad x(0) = 2, \quad x'(0) = 4\sqrt{3} - 2$$

describes the motion of a spring. Solve the problem and put your solution in the form

$$x(t) = Ce^{-pt}\cos(\omega t - \alpha).$$

Check your answer.

3. (12 points) Find the general solution of $xy' = y + 2\sqrt{xy}$. Express your answer in the form $y(x)$. **Check your answer.**

4. (12 points) Find the general solution of $x\frac{dy}{dx} + 6y = 3xy^{4/3}$. Express your answer in the form $y(x)$. **Check your answer.**