Math 242,   Exam 3,   Spring 2012

Write everything on the blank paper provided.

You should KEEP this piece of paper.

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. There are **4** problems.

SHOW your work. $\boxed{CIRCLE}$ your answer. Write **coherently**.

No Calculators or Cell phones.

1. (13 points) Find the Laplace transform of $f(t) = \begin{cases} 0 & \text{if } 0 \le t < 1 \\ t & \text{if } 1 \le t. \end{cases}$

2. (13 points) Solve the Initial Value Problem $y'' + 3y' + 2y = e^x$, $y(0) = 0$, $y'(0) = 3$.

3. (12 points) Find the general solution of $y'' - 6y' + 13y = 0$.

4. (12 points) Suppose that a body moves through a resisting medium with resistance proportional to its velocity $v(t)$, so that $\frac{dv}{dt} = -kv$. Let $x(t)$ be the position of the object at time t. Let $v(0) = v_0$ and $x(0) = x_0$. Find the velocity and position of the object at time t. Find $\lim\limits_{t\to\infty} x(t)$.