Math 242, Final Exam, 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 100 points. There are **10** problems. Each problem is worth 10 points.

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

No Calculators or Cell phones.

1. Solve the initial value problem $\frac{dy}{dx} = xe^{-x}$, $y(0) = 1$. **Check your answer.**

2. Solve $y^3 \frac{dy}{dx} = (y^4 + 1)\cos x$. **Check your answer.**

3. Solve the initial value problem $x\frac{dy}{dx} + 3y = 2x^5$, $y(2) = 1$. **Check your answer.**

4. Solve $\frac{dy}{dx} = \sqrt{x + y + 1}$. **Check your answer.**

5. Solve the initial value problem $y'' + 4y = 2x$, $y(0) = 1$, $y'(0) = 2$. (In this problem y is a functon of x.) **Check your answer.**

6. Solve $y'' + y' + y = \sin^2 3x$. (In this problem y is a functon of x.) **Check your answer.**

7. Use the method of Laplace transforms to solve the initial value problem $x'' + 9x = \sin(t)$, $x(0) = x'(0) = 0$. (In this problem x is a functon of t.) **Check your answer.**

8. Find a nontrivial solution of $tx'' + (t-2)x' + x = 0$, with $x(0) = 0$. (In this problem x is a functon of t.) **Check your answer.**

9. Find $\mathcal{L}(\frac{\sin t}{t})$.

10. Find $\mathcal{L}^{-1}(\ln \frac{s^2+1}{(s+2)(s-3)})$.