

Math 242, Final Exam, Spring 2010

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. *CIRCLE* your answer. Write **coherently**.

No Calculators or Cell phones.

I will grade this exam on May 6. Your grade will not be posted on VIP until then.

1. Solve the initial value problem $\frac{dy}{dx} = x\sqrt{x^2 + 9}$, $y(-4) = 0$. **Check your answer.**
2. Solve the initial value problem $(\tan x)\frac{dy}{dx} = y$, $y(\frac{\pi}{2}) = \frac{\pi}{2}$. **Check your answer.**
3. Solve the initial value problem $\frac{dy}{dx} + y = e^x$, $y(0) = 1$. **Check your answer.**
4. Solve $\frac{dy}{dx} = (4x + y)^2$. **Check your answer.**
5. Solve the initial value problem $y'' + y = 3x$, $y(0) = 2$, $y'(0) = -2$. (In this problem y is a function of x .) **Check your answer.**
6. Solve $y'' - y' - 6y = 2 \sin 3x$. (In this problem y is a function of x .) **Check your answer.**
7. Solve the initial value problem $x'' + 9x = f(t)$, $x(0) = x'(0) = 0$, where
$$f(t) = \begin{cases} \sin t & \text{if } 0 \leq t \leq 2\pi \\ 0 & \text{if } 2\pi < t. \end{cases}$$
(In this problem x is a function of t .) **Check your answer.**
8. Find a nontrivial solution of $tx'' + (3t - 1)x' + 3x = 0$, with $x(0) = 0$. (In this problem x is a function of t .) **Check your answer.**
9. Find $\mathcal{L}\left(\frac{1 - \cos 2t}{t}\right)$.
10. Find $\mathcal{L}^{-1}\left(\arctan \frac{3}{s+2}\right)$.