TEST 3

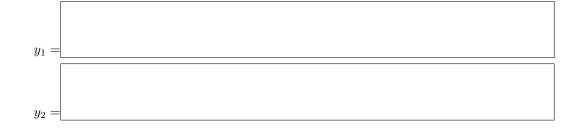
Math 271 - Differential Equations	Score: out of 10	0
4/23/2014	Name:	
Read all of the following information before star	ting the exam:	

- You have 50 minutes to complete the exam.
- Show all work, clearly and in order, if you want to get full credit. Please make sure you read the directions for each problem. I reserve the right to take off points if I cannot see how you arrived at your answer (even if your final answer is correct).
- Please box/circle or otherwise indicate your final answers.
- Please keep your written answers brief; be clear and to the point. I will take points off for rambling and for incorrect or irrelevant statements.
- This test has 5 problems and is worth 100 points. It is your responsibility to make sure that you have all of the pages!
- Good luck!

1. x = 0 is an ordinary point of the differential equation:

$$y'' - xy' + 2y = 0.$$

Find two linearly independent power series solutions about x = 0. You should write down the first three nonzero terms of each series solution (unless your solution is a finite number of terms).



2. Find the following Laplace transforms

(a) $\mathscr{L}\{2+t^5+e^{-3t}\}$

(b) $\mathscr{L}\left\{e^{6t}\cos(3t)\right\}$

(c) $\mathscr{L}{4t\mathscr{U}(t-9)}$

3. Find the following **inverse** Laplace transforms

(a)
$$\mathscr{L}^{-1}\left\{\frac{1}{s^5} + \frac{s}{s^2 + 100}\right\}$$

(b)
$$\mathscr{L}^{-1}\left\{\frac{1}{(s-4)^2+1}\right\}$$

(c)
$$\mathscr{L}^{-1}\left\{e^{-5s}\left(\frac{6}{s^2+36}\right)\right\}$$

4. Write f(t) in terms of unit step functions (Heaviside functions) if

$$f(t) = \begin{cases} 1, & 0 \le t < \pi, \\ \ln(t), & \pi \le t. \end{cases}$$

f(t) =

5. Use the Laplace transform to solve the following initial value problem:

$$y'' + 9y = 10e^t$$
, $y(0) = 0$, $y'(0) = 0$

