**MA 241** TEST # 4 Name: _____
November 23, 1999 SS #: _____
*Show All Work* Row #: _____

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1. (10 pts each) Solve each of the following differential systems:
   (a) $y'' + 3y' - 4y = 0$, $y(0) = 2$, $y'(0) = -3$.
   (b) $y'' - 2y' + 2y = 0$, $y(0) = 1$, $y'(0) = 1$.
   (c) $y'' + 4y' + 4y = 0$, $y(0) = 0$, $y(1) = 3$.
2. (15 pts) Find a particular solution for the differential equation $y'' - 2y' + 5y = x + \sin x$.
3. (15 pts) Solve the problem $y'' + 2y = e^x \sin x$ with initial values $y(0) = 1$, $y'(0) = 1$.
4. (10 pts each) Determine whether the series converges or not. If it converges, find its sum.
   (a) $\sum_{n=1}^{\infty} \frac{(-3)^{n-1}}{4^n}$.
   (b) $\sum_{n=1}^{\infty} \ln\left(\frac{n}{2n+5}\right)$.
5. (10 pts each) Determine whether the series converges or not by using appropriate convergence test. Specify the test you are using.
   (a) $\sum_{n=2}^{\infty} \frac{1}{n \ln n}$.
   (b) $\sum_{n=1}^{\infty} (-1)^{n-1} \frac{\ln n}{n}$.
6. Find the radius of convergence for the series $\sum_{n=1}^{\infty} \frac{2^n (x-3)^n}{n+3}$.