Exam 3

Math 204 A Name_____

November 20, 1995

"It's a pretty geeky thing to be in the math club, and what's worse, I was the president." Dexter Holland of the punk band Offspring, from the *Cincinatti Enquirer*, Feb 4, 1995.

1. (25 pts) Use the Laplace transform to solve the IVP

$$y'' + 4\,y' + 13\,y = 5\,e^{-2t}, \quad y(0) = -1, \quad y'(0) = -2$$

2. (25 pts) Use the Laplace transform to solve the IVP

$$y'' + y = 2\,\sin t - 3\,\cos t, \quad y(0) = y'(0) = 0$$

3. (25 pts) the current in a single loop L-R-C circuit is governed by the integrodifferential equation

$$L\,\frac{di}{dt} + R\,i + \frac{1}{C}\int_0^t i(\tau)\,d\tau = E(t).$$

Determine the current when $L = 0.1$, $R = 20$, $C = 10^{-3}$, and $E(t) = \begin{cases} 120\,t & for \quad 0 \le t < 1 \\ 0 & for \quad t \ge 1 \end{cases}$

4. (25 pts) Write down your student number. If it is even, solve for $x(t)$, and if it is odd, solve for $y(t)$ in the following system of IVPs. Don't do extra work!

$$\begin{cases} \frac{d^2x}{dt^2} = y, & x(0) = 1, \quad x'(0) = 2 \\ \frac{d^2y}{dt^2} = x, & y(0) = 1, \quad y'(0) = 0 \end{cases}$$