

Name: _____

Math 211

Exam 3

May, 3, 1999

(1) (20 pts) Using Laplace transform to solve

$$y'' + y = \sin(3t)$$

subject to initial conditions $y(0) = 1$ and $y'(0) = 0$.

(2) (20 pts) Find the general solution of problem (1). Then find the solution corresponding to the given initial conditions there. [check that both answers are the same.]

(3) (25 pts) Find the general solution of

$$y'' - 3y' + 2y = e^t + 1$$

(4) (20 pts) Using Laplace transform, find the solution of

$$y' + y = u_2(t)e^{(t-2)}$$

with $y(0) = 0$. Here $u_2(t)$ is the usual step function, i.e., $u_2(t) = 0$ when $t \leq 2$, and $u_2(t) = 1$ when $t > 2$.

(5) (4 pts) (a) Show that

$$\frac{s^2 - \omega^2}{(s^2 + \omega^2)^2} = \frac{1}{(s^2 + \omega^2)} - 2\omega^2 \frac{1}{(s^2 + \omega^2)^2}$$

(11 pts) (b) Using results in part (a), and the result listed in tables of Laplace transform, find the inverse Laplace transform of $\frac{1}{(s^2 + \omega^2)^2}$.