

24-352 DYNAMIC SYSTEMS & CONTROL

HOMEWORK ASSIGNMENT #5

DUE 2/21/01

PROBLEMS

From the textbook 7.3, 7.5

1. Use Laplace transforms to find $y(t)$ where $y(0) = 0$, $y'(0) = 0$ and $m y''(t) + k y(t) = f_0 \delta(t)$
2. Suppose $y(t)$ satisfies the equation:
 $y''(t) + y'(t) + 25 y(t) = f(t)$
subject to the initial conditions: $y(0) = 0$ and $y'(0) = 0$.

Use Laplace transforms to do the following exercises

- a. Find and plot the solution, $y_i(t)$, when $f(t)$ is the unit impulse $\delta(t)$.
- b. At what value of time t_0 is y_i first equal to zero? ($t_0 > 0$).
- c. Find and plot the solution, $y_H(t)$, when $f(t)$ is the unit step function $H(t)$.
- d. From the plot determine the time t_M at which y_H is maximum. What is the maximum value of y_H ? How does t_M compare with t_0 from part b?
- e. Explain the results that you got in part d.