

Differential Equations (92.236)
Homework Assignment #15 Spring 2007
Introduction to Laplace Transforms

Problem 1:

Use the basic definition of the Laplace transforms to find the L.T. of the following functions (show your work):

- a. $f(t) = t$
- b. $f(t) = e^{3t+1}$

Problem 2:

Use a table of Laplace transform pairs to find the inverse L.T. of the following functions:

- a. $F(s) = \frac{5-3s}{s^2+9}$
- b. $F(s) = \frac{10s-3}{25-s^2}$

Problem 3:

Use Laplace transforms to solve the following IVPs:

- a. $x'' + 4x = 0$ with $x(0) = 5$ and $x'(0) = 0$
- b. $x'' + 8x' + 15x = 0$ with $x(0) = 2$ and $x'(0) = -3$
- c. $x'' + 9x = 1$ with $x(0) = 0$ and $x'(0) = 0$
- d. $x'' + 2x + 4y = 0$ and $y'' + x + 2y = 0$

with ICs: $x(0) = 0$, $x'(0) = -1$ and $y(0) = 0$, $y'(0) = -1$