

Homework Assignment 12 in Differential Equations, MATH308-Summer 2012

due June 29, 2012

Topics covered : *inverse Laplace transform of rational functions using partial fraction decomposition; solution of initial value problems using Laplace transform; step function and Laplace transform of discontinuous functions (corresponds to sections 6.2, 6.3 in the textbook)*

The total number of points in this assignment is 120

1. Find the inverse Laplace transform of the given function:

$$(a) F(s) = \frac{3s - 4}{(s^2 + 4s - 12)(s - 2)}$$

$$(b) F(s) = \frac{-5s + 1}{(s^2 + 2s + 17)(s + 1)}$$

2. Using the method of Laplace transform solve the following initial value problem:

$$y'' + 2y' - 15y = 10e^{3t} \sin 2t, \quad y(0) = -1, \quad y'(0) = 2.$$

3. Find the Laplace transform of the function

$$f(t) = \begin{cases} 2 & t < 2, \\ t - 2 & 2 \leq t < 3, \\ 1 - 2t & 3 \leq t. \end{cases}$$