

Homework Assignment 10 in Differential Equations, MATH308-Spring 2015

due March 23, 2015

Topics covered : *step function and Laplace transform of discontinuous functions (corresponds to sections 6.3, 6.4 in the textbook)*

1. Find the Laplace transform of the function

$$f(t) = \begin{cases} 1 & t < 3, \\ t + 1 & 3 \leq t < 5, \\ 1 - 3t & 5 \leq t. \end{cases}$$

2. Find the inverse Laplace transform of the function $\frac{e^{-3s}(2s+1)}{s^3 - 2s^2 + 10s}$.
3. Find the solution of the initial value problem $y'' + 9y = g(t)$; $y(0) = -2$, $y'(0) = 1$, where

$$g(t) = \begin{cases} \sin t, & 0 \leq t < \frac{\pi}{2} \\ 1 - \sin t, & t \geq \frac{\pi}{2}. \end{cases}$$