

Homework Assignment 11 in Differential Equations, MATH308-Spring 2015

due March 27, 2015

Topics covered : *initial value problems with impulse forcing functions; convolution integrals (corresponds to sections 6.5, 6.6 in the textbook)*

1. Solve the initial value problem and sketch a graph of the solution:

$$y'' + 9y = 2\delta\left(t - \frac{\pi}{2}\right) - \delta\left(t - \frac{3\pi}{2}\right), \quad y(0) = 1, y'(0) = 0.$$

2. Use the convolution theorem to find the inverse Laplace transform of the given function:

$$\frac{s}{(s^2 + 1)(s^2 + 4)}$$

3. (a) Express the solution of the given initial value problem in terms of a convolution integral:

$$y'' - 4y' + 20y = g(t), \quad y(0) = 1, y'(0) = 0. \tag{1}$$

- (b) (**bonus-25 points**) Find the solution of the same initial value problem (1) using the method of variation of parameter. Show that your answer coincides with the answer obtained in item (a).