

# Homework Assignment #13

Fall 2013 - MATH308

due Monday Nov 4 at the beginning of class

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

1. Given IVP

$$y'' + 25y = \delta\left(t - \frac{3\pi}{2}\right) + 25\delta\left(t - \frac{\pi}{2}\right), \quad y(0) = 1, y'(0) = 0.$$

- (a) Solve the given IVP. Simplify your answers using trigonometric formulas (as it was demonstrated in class).  
(b) Graph the obtained solution.

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

$$\frac{s}{(s^2 + 9)(s^2 + 25)}$$

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-15 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).