Homework Assignment #11   Fall 2013 - MATH308

due Wednesday Oct 23 at the beginning of class

Topics covered : *definition and properties of Laplace transform; solution of initial value problems using Laplace transform, inverse Laplace transform of rational functions using partial fraction decomposition; (corresponds to sections 6.1 and 6.2)*

1. Using an appropriate algebra and Laplace Transform properties (see also the Table) find the Laplace Transform of the given functions:

   (a) $f(t) = (2013 + e^{-t} - 3e^{2t})\sin 4t$

   (b) $g(t) = e^{13t}(t + 1)^2$

   (c) $y(t) = e^t(4 + 5t^3 + 12\cos\dfrac{t}{4})$

2. Find the inverse Laplace Transform of the given functions

   (a) $F(s) = \dfrac{2s + 1}{s^2 - 7s + 12}$

   (b) $H(s) = \dfrac{3s - 9}{s^2 + 4s + 29}$

   (c) $Y(s) = \dfrac{2s - 1}{s^2(s + 1)^3}$

3. Solve for $Y(s)$, the Laplace transform of the solution $y(t)$ to the given initial value problem (you do not need to find the solution $y(t)$ itself here):

   (a) $4y'' - 17y' + 13y = e^{-t}\cos 3t, \quad y(0) = 2,\, y'(0) = -1;$

   (b) $2y'' + 3y' - 5y = t^4 e^{4t}, \quad y(0) = 1,\, y'(0) = 0$

4. Using the Laplace transform find the solution of initial value problem

$$4y'' - 17y' + 13y = e^{-t}\cos 3t, \quad y(0) = 0,\, y'(0) = 0.$$