Math 2250 Lab 11 Name: _____
Due Date: 04/02/2015

1. Solve the following forward and backward table problems.

   (a) Find the Laplace integral $\mathcal{L}(g(t))$ for $g(t) = t\sin(\omega t)$, using the Forward Laplace Table and the s-Differentiation Theorem

   $$\mathcal{L}(tf(t)) = \frac{-d}{ds}\mathcal{L}(f(t))$$

   (b) Find signal $f(t)$ given the equation $\mathcal{L}(f(t)) = \frac{2}{s^2} + \frac{3}{s+1} + \frac{2s+1}{s^2+10}$.

   References: Chapter 10. Forward and backward Laplace tables:
   `http://www.math.utah.edu/~gustafso/s2015/2250/laplaceIntro.pdf`
   Laplace rules, s-differentiation theorem:
   `http://www.math.utah.edu/~gustafso/s2015/2250/laplaceRules.pdf`

2. Use Laplace transforms to solve the initial value problem

$$x'' + \frac{1}{4}x = \sin\left(\frac{1}{2}t\right),$$
$$x(0) = x'(0) = 0.$$

(a) Use technology to plot your solution $x(t)$. Print the plot and turn it in with your lab.

(b) Does the plot of x(t) represent resonance or beats? Explain fully, including derivation details for the envelope curves $x = \sqrt{t^2+4}$ and $x = -\sqrt{t^2+4}$.