Chapters 5 and 10 Review **Math 2250** **November 14, 2008**

Name:

1. Using the method of undetermined coefficients, solve the differential equation

$$y'' + 4y = x\sin(x) + 8$$

2. Using variation of parameters, solve the differential equation

$$y'' - 4y = sinh(2x)$$

3. Use Laplace transforms to solve the initial value problem

$$x'' + 4x = \sin(3t),$$
$$x(0) = x'(0) = 0$$

4. Find the transient motion and steady periodic oscillations of a damped mass and spring system with m=1, c=2, and k=26 under the influence of an external force F(t)=82cos(4t), with x(0)=6 and x'(0)=0.

5. Apply the convolution theorem to find the inverse Laplace transform of the function

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

A short table of Laplace Transforms	
$f(t)$	$F(s)$
1	$\frac{1}{s}\ (s>0)$
t	$\frac{1}{s^2}\ (s>0)$
$t^n\ (n\geq 0)$	$\frac{n!}{s^{n+1}}\ (s>0)$
e^{at}	$\frac{1}{s-a}\ (s>0)$
$\cos(kt)$	$\frac{s}{s^2+k^2}\ (s>0)$
$\sin(kt)$	$\frac{k}{s^2+k^2}\ (s>0)$
$\cosh(kt)$	$\frac{s}{s^2-k^2}\ (s>\lvert k\rvert)$
$\sinh(kt)$	$\frac{k}{s^2-k^2}\ (s>\lvert k\rvert)$
$u(t-a)$	$\frac{e^{-as}}{s}\ (s>0)$