Math 250 Exam #4 Fall 2008	**Show all work** (and answers) on the blank paper provided. Write nothing on this paper other than your name.	**Name:**

1	20	
2	20	
3	20	
4	20	
5	20	
6	20	
7	20	
8	20	
total	160	
curve		
%		

1) Find a general solution to $y''(\theta) + 2y'(\theta) + 2y(\theta) = e^{-\theta}\cos\theta$

2) Find the solution to the initial value problem:
$y'' + y' - 12y = e^{t} + e^{2t} - 1, \quad y(0) = 1, \quad y'(0) = 3$

3) A 1 kg mass is attached to a spring with stiffness 6.25 N/m. The damping constant for the system is 3 N-sec/m. If the mass is pulled 0.25 m to the right of equilibrium and given an initial leftward velocity of 2 m/sec, when will it first return to its equilibrium position?

4) For the system given in #3, find the quasiperiod and quasifrequency of the mass.

5) A 0.5 kg mass is attached to a spring with stiffness 8 N/m. The damping constant for the system is 0.4 N-sec/m. If the mass is moved 1 m to the left of equilibrium and released, what is the maximum displacement to the right that it will attain?

6) An 8-kg mass is attached to a spring hanging from the ceiling and allowed to come to rest. Assume the spring constant is 40 N/m and the damping constant is 3 N-sec/m. At time t=0 an external force of $2\sin 2t$ is applied to the system. Determine the amplitude and frequency of the steady-state solution. Acceleration due to gravity is g = 9.8 m/sec^2.

7) Find the Laplace transform of te^{3t} using the *definition* of the Laplace transform.

8) Using the definition of Laplace transform, find the Laplace transform of
$$f(t) = \begin{cases} 1-t, & 0 < t < 1 \\ 0, & t > 1 \end{cases}$$