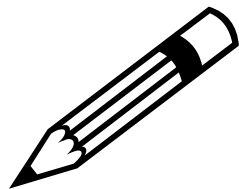


**MAT 250  
Exam #2  
Fall 2004**

**Choose any 5 of the 7 problems below to work. Cross out the 2 problems you've elected not to do!**

**Name:**

<b>1</b>	<b>20</b>		1) Find a general solution to $2u'' + 7u' - 4u = 0$ .
<b>2</b>	<b>20</b>		2) Determine the form of a particular solution for $y'' + 9y = 4t^3 \sin 3t$ . (Do not evaluate coefficients.)
<b>3</b>	<b>20</b>		3) Use the Method of Undetermined Coefficients to find a particular solution to $y'' - 2y' + y = 8e^t$ .
<b>4</b>	<b>20</b>		4) Find the solution to the initial value problem $y'' + y = 2e^{-x}$ , $y(0) = 0$ , $y'(0) = 0$
<b>5</b>	<b>20</b>		5) Starting at $t = 0$ , fresh water is pumped at the rate of 3 gal/min into a 60-gal tank initially filled with brine. The resulting less-and-less salty mixture overflows at the same rate into a second 60-gal tank that initially contained only pure water, and from there it eventually spills onto the ground. Assuming perfect mixing in both tanks, when will the water in the second tank taste saltiest?
<b>6</b>	<b>20</b>		6) A 2-kg mass is attached to a spring with stiffness 40 N/m. The damping constant for the system is $8\sqrt{5}$ N-sec/m. If the mass is pulled 0.1 m to the right of equilibrium and given an initial rightward velocity of 2 m/sec, what is the maximum displacement from equilibrium that it will attain?
<b>7</b>	<b>20</b>		7) An object of mass 5 kg is given an initial downward velocity of 50 m/sec and then allowed to fall under the influence of gravity. Assume that the force in newtons due to air resistance is $-10v$ , where $v$ is the velocity of the object in m/sec. Determine the equation of motion of the object. If the object is initially 500 m above the ground, determine when it will strike the ground. (The equation on the board may help out.)
<b>Total</b>	<b>100</b>		
<b>Curve</b>			
<b>Grade</b>			



**Show your work neatly.**