NAME:

ID.NO:

Problem	Score	Problem	Score
I.		VI.	
II.		VII.	
III.		VIII.	
IV.		IX.	
V.		X.	
		Total	

MA 266, Second MidTerm Examination, Wilkerson Sections

75 minutes, Early Makeup , Nov. 17-28, 2000

Do all your work on the question sheets. Calculators are NOT allowed. NO BOOKS OR PAPERS ARE ALLOWED. Use the back of the test pages for scrap paper.There is a short table of LaPlace transforms on the last page. You can remove this for use.

In Problems 1 and 2 find the general solution of the homogeneous differential equations in (a) and use the method of undetermined coefficients to find the **form** of a particular solution of the nonhomogeneous equations in (b) and (c).

1. (a) $y'' - 2y' = 0$

(b) $y'' - 2y' = t^2 e^{2t}$

(c) $y'' - 2y' = t + e^t$

2. (a) $y'' - 2y' + y = 0$

(b) $y'' - 2y' + y = te^t$

(c) $y'' - 2y' + y = te^{2t}$

4. Find the solution of the initial value problem$y'' + y = t^2,\ y(0) = 1,\ y'(0) = 2.$

1. (a) Find the general solution of the homogeneous differential equation$d^5ydt^5 + 2d^3ydt^3 + dydt = 0.$

(b) Use the method of undetermined coefficients to find the **form** of a particular solution of the nonhomogeneous equation $d^5ydt^5 + 2d^3ydt^3 + dydt = 1 + t\cos t$.You do not need to solve for the values of the coefficients.

2. (a) Find the general solution of the homogeneous differential equation$d^5ydt^5 - d^3ydt^3 = 0.$

(b) Use the method of undetermined coefficients to find the **form** of a particular solution of the nonhomogeneous equation $d^5ydt^5 - d^3ydt^3 = t + e^t$.You do not need to solve for the values of the coefficients.

6. The initial value problem $mu'' + \gamma u' + ku = 0, u(0) = 1, u'(0) = 1$, describes the motion of a mass hanging vertically from a spring, so $m > 0, \gamma \geq 0$, and $k > 0$. Sketch a representative graph of the solution if $\gamma^2 - 4mk > 0$.

9. A mass that weighs 8 pounds stretches a spring 0.25 feet. The mass is acted upon by an external force of $2\cos 3t$ pounds and moves in a medium that imparts a viscous force of 6 pounds when the speed of the mass is 3 feet/sec.

At time $t = 0$ the mass is 0.5 feet below the equilibrium position of the system and the mass is moving upward at 2 feet/sec.

Set up an initial value problem that describes the motion of the mass. You do not need to solve the initial value problem.

$mu'' + \gamma u' + ku = F_0 \cos(\omega t)$

$w = mg,\ g = 32$ feet/sec^2

Damping constant, $\gamma = ForceSpeed$

Spring constant, $k = ForceDisplacement$