M E T U

Northern Cyprus Campus

Math 219 Differential Equations I. Exam 20.03.2009		
Last Name : Name : Student No:	Dept./Sec. : Time : 17: 40 Duration : 110 *minutes*	Signature
5 QUESTIONS ON 5 PAGES		TOTAL 100 POINTS

1	2	3	4	5			

EACH PROBLEM - 20 POINTS.

Question 1. Consider the first order linear homogeneous differential equation $y' + p(t)\, y = 0$, where $p(t)$ is a continuous function on the interval $(-1, 1)$. Is it possible that the function $y(t) = te^{2t}$ is a solution of this equation? Explain your answer.

Question 2. Solve the differential equation $x^2\sqrt{y}dx + e^{x^3}dy = 0$.

Question 3. Consider the differential equation $\left(y^4 + 2y\right) dx + \left(xy^3 + 2y^4 - 4x\right) dy = 0$.

(a) Find an integration factor which depends upon only x or y?

(b) Solve the differential equation based on the obtained integrating factor.

Question 4. Consider the differential equation $t^2y'' - 2t(t+1)y' + 2(1+t)y = 0$, $t > 0$. Show that it has a nontrivial solution like $y = t^\alpha$, $\alpha > 0$, and using this solution find its fundamental solution set. Check your answer involving the Wronskian argument.

Question 5. Solve the initial value problem

$$\begin{cases} y'' + y = 5\sin(t) \\ y(0) = 0 \\ y'(0) = -3/2 \end{cases}$$

using the method of undetermined coefficients.