MA2243 Exam 1 Fall 2005 Name:_____

(20 pts) 1. Find the solution of the initial value problem

$$y' = \frac{t(y^2+4)}{y}, \quad y(0) = -1.$$

Solve for y when possible.

(20 pts) 2. Determine whether the following initial value problems have a unique solution near the initial data. Explain your answer clearly.

(1) $y' = \dfrac{1}{\sqrt{y}}, \qquad y(0) = 1$

(2) $y' = \tan y, \qquad y(0) = \dfrac{\pi}{2}$

(20 pts) 3. Sheryl deposits \$500 in a savings account that pays an annual rate of 10% compounded continuously. Sergei has no money. However, during each year after that, he will deposit \$70 into an account that pays interest at an annual rate of 10% compounded continuously. Assume that investments are made continuously. Find the balance of each account after 10 years.

Sheryl	
Sergei	

(20 pts) 4. Find the general solution of $y' + \dfrac{y}{t} = \sin t$.

(20 pts) 5. Find the orthogonal trajectories to the family of curves $y = \dfrac{c}{x^3}$.