Assignment 1
Math 302 - Fall 2006
Prof. J. A. Pelesko
Due September 8, 2005

(1) (5 points) Integrate:

$$\int_2^3 \frac{1}{x^2-1}$$

(2) (5 points) Integrate

$$\int t^3 e^{-2t} dt$$

(3) (5 points) Compute the first derivative of

$$\frac{\sec\theta}{1+\sec\theta}$$

(4) (5 points) Compute the first derivative of

$$(1+\tan t)^{1/3}$$

(5) (10 points) Show that $y(x) = x - 1/x$ is a solution of the differential equation

$$xy' + y = 2x$$

(6) (5 points) What non-trivial function is equal to its own derivative?

(7) (10 points) Name two functions, that when differentiated twice are equal to themselves.

(8) (15 points) Using Maple, plot the direction field of

$$y' = y(y+3)$$

(9) (20 points) In class, we gathered data on the flow of water and the flow of sand out of a tube. Using Maple, plot the results of the experiments. Carefully label your plots. The results from each experiment should be distinguishable. What curve would you guess best fits the data from each experiment?

(10) (20 points) A spherical raindrop evaporates at a rate proportional to its surface area. Write a differential equation for the *volume* of the raindrop as a function of time. Solve this differential equation and using Maple, plot a typical solution. Does the raindrop evaporate in finite time?