

**MTH 244 Differential Equations - Spring 2003**  
**Maple homework 1**

1. Consider the initial-value problem (IVP)

$$x \frac{dy}{dx} + 2y = \sin x, \quad y(\pi/2) = 1$$

- (a) find a solution  $y = f(x)$  with Maple.  
(b) Graph  $f(x)$  on the intervals  $0 < x \leq 2$ ,  $1 \leq x \leq 10$ , and  $10 \leq x \leq 100$ . Describe the behavior of the solution (a) near  $x = 0$ , and, (b) for large values of  $x$ .
2. Consider the differential equation

$$\frac{dy}{dx} = \frac{x - e^{-x}}{y + e^y}$$

- (a) Solve it using Maple. Observe that the solution is given implicitly in the form

$$f(x, y) = c.$$

- (b) Use **contourplot** to see what the solution curves look like. For your  $x$  and  $y$  ranges you might use  $-1 \leq x \leq 3$  and  $-2 \leq y \leq 2$ .  
(c) Use **implicitplot** to plot the solution satisfying the initial condition  $y(1.5) = 0.5$  your plot should show two curves. Indicate which one corresponds to the solution.

---

### Additional Information

- The homework should have only one author. You may discuss the project with other students in class, but what you should turn in should be your own work, with your own comments inserted in appropriate places..
- You must use electronic submission to turn in your Maple homework.
- MAPLE should be used in all calculations and plots.
- For a quick reference guide on using Maple for solving Differential Equations, visit the web site of the course, *www.math.uri.edu* → *Spring 2003 Courses* → *mth244*.