Homework 9: Boundary value problems

Due: *Thursday, April 16, 2009*

1. Read Burden and Faires Chapters 11.1 and 11.2.

2. Burden and Faires, Chapter 11.2, Problem 1.

3. <u>The return of van der Pol.</u> The van der Pol equation prescribes the motion of a particle $x(t)$ by

$$x''(t) - \mu(1 - x(t)^2)x'(t) + x(t) = 0. \tag{1}$$

   Previously we transformed Eq. (1) into a 2×2 system of first-order ODEs, and solve the resulting initial value problem.

   (a) This time, solve the same equation as a boundary value problem. Use the shooting method. Let $\mu = 0.5$, $x(0) = 0$, and $x(2) = 1$.

   (b) Graph the solution $x(t)$ for $0 \leq t \leq 2$.