Reviewing Numerical Methods

- Read section 2.8, pages 32-35 and redo the example using Maple (not MacMath).
- Do the exercises on page 42, section 2.8: 2.8.3,2.8.4, 2.8.5
- Remember, Maple uses a 4th order Runge -Kutta solver. You will have to write a small program that computes the Euler Method and the improved Euler Method. (see hints below).
- Euler's Method: to solve $x' = f(x,t)$
  1. Define $f(x,t)$
  2. input initial condition (t_0, x_0)
  3. input step size h, and number of steps n
  4. output (t_0, x_0)
  5. for j from 1 to n do
  6. $k1 = f(t,x) \qquad x = x + h * k1 \qquad t = t + h$
  7. output t and x
  8. end
- Improved Euler's Method: to solve $x' = f(x,t)$

  How does the algorithm above change to include the improvement?

  Step 6 modified: $k1 = f(t,x) \quad k2 = f(t+h, x+h*k1) \quad x = x + (h/2)*(k1 + k2) \quad t = t + h$
- You should write these methods as routines you can use again.
- BIFUCATIONS

  You will need to write a subroutine to draw bifurcation diagrams. We will use this routine over and over again throughout the semester.

  TEST your routine using the normal form functions for the three major types of bifurcations we studied in class: SNB, TB, PB.
- THIS IS ALL DUE NEXT THURSDAY, Sept. 21. Send the maple notebooks to me, using "attach" in PINE by 5pm. This means that you should use comments in the notebook to help me understand what is what. BE very explicit. I don't want to have to DIG to figure stuff out.