## Mathematics 5410 Chaos and Euler's Method

The Project: For the initial value problem

$$
y^{\prime}=y(1-y), \quad y(0)=1.3
$$

solve numerically by Euler's numerical method

$$
y_{0}=1.3, \quad y_{n+1}=y_{n}+h\left(1-y_{n}\right) y_{n},
$$

for the given values of $h$. Plot the solutions and try to reproduce the figures of Section 2.7 in Borrelli-Coleman.

$$
\begin{array}{ll}
h=1.65 & \text { Figure 2.7.1 } \\
h=2.1 & \text { Figure 2.7.2 } \\
h=2.5 & \text { Figure 2.7.3 } \\
h=2.56 & \text { Figure 2.7.4 }
\end{array}
$$

The plots package in maple is useful. Most of this project can be accomplished directly with plot in mapleV4, using plot option style=POINT.
The exact solution for the given initial value problem is

$$
y(t)=\frac{1}{1-.2307692308 e^{-t}}
$$

This solution is obtained from the general solution

$$
y(t)=\frac{1}{1-e^{-t} \frac{-1+y_{0}}{y_{0}}}
$$

by setting $y_{0}=1.3$.

