2. Carry out Computer Problem 1 for the Trapezoid Method.

Adapt pendulum to model the damped pendulum. Run the resulting code with $d = 0.1$. Except

6.3.4.6

$y'' - 2ty' + 2y = 0$ $\quad y_1 = y \quad y_2 = y' = y_1' \quad y_1(0) = 1 \quad y_2(0) = 1$

$y_2' = 2ty_2 - 2y_1 \qquad y_1' = y_2$

1 step $\quad h = \frac{1}{4}$

$y_2\left(\frac{1}{4}\right) = 1 + \frac{1}{8}\left((2 \cdot 0 \cdot 1 - 2 \cdot 1) + \left(2 \cdot \frac{1}{4} \cdot 1 - 2 \cdot \left(\frac{1}{4}(2 \cdot 0 \cdot 1 - 2 \cdot 1)\right)\right)\right)$

$y_2\left(\frac{1}{4}\right) = 1 + \frac{1}{8}\left((0 - 2) + \left(\frac{1}{2} - 2\left(\frac{1}{4}(0 - 2)\right)\right)\right)$

$y_2\left(\frac{1}{4}\right) = 1 + \frac{1}{8}\left((-2) + \left(\frac{1}{2} - 2\left(-\frac{1}{2}\right)\right)\right)$

$y_2\left(\frac{1}{4}\right) = 1 + \frac{1}{8}\left(-2 + \left(\frac{1}{2} + 1\right)\right) = 1 + \frac{1}{8}\left(-2 + \frac{3}{2}\right) = 1 + \frac{1}{8}\cdot\left(-\frac{1}{2}\right)$

$y_2\left(\frac{1}{4}\right) = 1 - \frac{1}{16} = \frac{15}{16} = .9375$

$y_1\left(\frac{1}{4}\right) = 1 + \frac{1}{8}(1 + .9375) = 1.2422$

$y_2\left(\frac{1}{2}\right) = .9375 + \frac{1}{8}\left(\left(2 \cdot \frac{1}{4} \cdot .9375 - 2 \cdot 1.2422\right) + \left(2 \cdot \frac{1}{2} \cdot \left(\frac{1}{4}(\ldots)\right) - 2 \cdot 1.2422\right)\right)$

$y_2\left(\frac{1}{2}\right) = .34350$

$y_1\left(\frac{1}{2}\right) = 1.2422 + \frac{1}{8}(.9375 + .34350)$

$y_1\left(\frac{1}{2}\right) = 1.4023$