

HW 6

2 IVP NON-LINEAR PENDULUM

$$y''(t) + \sin(t) = 0$$

$$y(0) = 1$$

$$y'(0) = 1$$

CONVERT TO A 1ST-ORDER

SYSTEM, THEN.

NOTES: "SYSTEMS"

USE 4TH ORDER RUNGE-KUTTA

TO @ $h = 0.5$
SOLVE FOR

$$y(1) =$$

$$y'(1) =$$

ANALYTICALLY,
 $y(1) = y'$
FUN...

$$y'_1 = f_1(y_1, \dots, y_N)$$

$$y'_N = f_N(y_1, \dots, y_N)$$

$$t = \frac{y}{\dot{y}}$$

VECTOR FORM

$$y' = f(y)$$



$$y = \begin{bmatrix} y_1 \\ y_2 \end{bmatrix}$$

$$f = \begin{bmatrix} f_1 \\ f_2 \end{bmatrix}$$

SPECIAL CASE:

$$y'_1 = a y_1 + b y_2$$

$$y' = A y$$

$$\begin{bmatrix} y_1 \\ y_2 \end{bmatrix}' = \begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} y_1 \\ y_2 \end{bmatrix}$$

$$f(y) = A y$$

* IMPLICIT METHODS
ARE IMPLEMENTED IN
PREDICTOR-CORRECTOR
SCHEMES