TABLES IN MATHEMATICA

PHYS 374, Fall 2004

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--"Vector" is to C++ as "table" is to Mathematica
--a table is a list of items between curly braces

Generating a Table:

→ Brute force: just type it in
→ Table[expression as function of j, {j, minimum j, maximum j, step size}]
→ semicolon suppresses output

→ Can make a table of tables (i.e. a matrix)
Table[{j,2*j},{j,1,4,1}]

Plotting Contents of a Table:

→ sample = Table[3*j,{j,2,14,3}]
→ ListPlot[sample] and ListPlot[sample, PlotJoined→True]

→ How to plot sample's data vs.20,50,80,110, and 140 instead of 1,2,3,4, and 5?

Operating on Tables:

→ 3 + sample
→ sample + sample
→ sample*sample (remember "period" = matrix multiplication)
→ sample/sample
→ sample[[4]] references 4th item…first item is index number 1
→Length[sample]
→ Append[sample,7], Prepend[sample,7], and Insert[sample,7,2]

Loops:

→ For[j = 2, j ≤ Length[sample], j = j + 1, sample[[j]] = sample[[j-1]]*3]

Application:

Use Mathematica to numerically approximate the solution to $dy/dt = 1.2y + .3$, over the interval $0 \leq t \leq 2.0$, subject to the initial condition $y(0) = 4$. Use Euler's Method with a step size of one-thousandth of a second. Graph this approximate solution.

More on Matrices:

→Inverse[], Det[], Tr[], Transpose[], Eigenvalues[], Eigenvectors[], Conjugate[]

→ from Oct. 14 class: