

Matlab familiarization exercises

Let $x = [3 \ 2 \ 6 \ 8]'$ and $y = [4 \ 1 \ 3 \ 5]'$ (NB. x and y should be column vectors).

- a. Add the sum of the elements in x to y
 - b. Raise each element of x to the power specified by the corresponding element in y .
 - c. Divide each element of y by the corresponding element in x
 - d. Multiply each element in x by the corresponding element in y , calling the result "z".
 - e. Add up the elements in z and assign the result to a variable called "w".
 - f. Compute $x'*y - w$ and interpret the result
-

Plot a graph of $y = x*\sin(x)$ for x values between 0 and 100. Make sure to use enough points so that the curve looks smooth. Label the title and axes.

Given the vector $x = [1 \ 8 \ 3 \ 9 \ 0 \ 1]$, write for loops that

- a. Add up the values of the elements (Check with **sum**.)
 - b. Computes the running sum (for element j , the running sum is the sum of the elements from 1 to j , inclusive. Check with **cumsum**.)
-

Write an m-file and a function file to solve the following system of ODEs.

$$\begin{aligned} dx/dt &= ax - bxy - cx^2 \\ dy/dt &= dxy - ey \end{aligned}$$

where $a = 0.05$, $b = 0.0002$; $c = 0.00001$; $d = 0.0003$; $e = 0.06$.

Solve for t between 0 and 300, with initial values of either

- 1) $x = 300$, $y = 100$
- 2) $x = 0$, $y = 100$

Create plots to show the behavior of x and y with time. x and y may be interpreted as prey and predator populations, respectively.

Further optional exercise: (fsolve)

Solve the equation for y given x over the range of 1 to 100:

$$1000 = y *(3+x) *(1+y)^4$$

Plot the solution curve (y vs x)
