

Lab Exercises 1

Basic MatLab Exercises

Yaoundé – 6 August 2013

1. With $x = 5$ and $y = 2$, compute the following quantities:

- $u = x + y$ $v = xy$ $w = x/y$ $z = w^3$
- $s = xy^2/(x - y)$ $p = 3x/2y$ $r = 3xy/2$ $t = x^5/(x^5 - 1)$

2. With $x = 10$ and $y = 3$, compute the following quantities:

- $r = 8 \sin(y)$ $s = 5 \sin(2y)$ $z = \sin(x)$
- $w = 2(\sin(x))/5$ $p = e^{x-1}$ $u = 2 + \cos(2\pi x)$ $m = \sqrt{x} + 4 + \sin(0.2\pi) + e^2$

3. With $x = 3$ and $y = 4$, compute the following quantities:

$$\frac{3}{2}xy \quad \left(1 - \frac{1}{x^5}\right)^{-1} \quad \frac{4(y - 5)}{3x - 6}$$

Then compute the same quantities as above with:

- $x = [3 \ 1 \ 0]'$ and $y = [0 \ 1 \ 1]'$. *Vector element-by-element Arithmetics*
- $x = \begin{bmatrix} -3 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$ and $y = \begin{bmatrix} 1 & 1 & 1 \\ 2 & 0 & -2 \end{bmatrix}$. *Array element-by-element Arithmetics*

4. With $A = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 5 & 6 & 7 & 8 \\ 9 & 10 & 11 & 12 \end{bmatrix}$, perform the following operations:

- Extract the 3rd column of matrix A and store it in vector B .
- Extract the 1st and 3rd columns of matrix A and store them in matrix C .
- Add the 1st and 3rd rows of matrix A together and store the result in vector D

- (d) Change the value in the 2nd row and 3rd column of A to 7 (instead of +7) and call the result AA (do not destroy/change the original A matrix).
- (e) Create a matrix that contains rows 1 and 3 from A , the second row of AA , and the result of step (c). The resultant 4x4 matrix should be

$$BB = \begin{bmatrix} 1 & 2 & 3 & 4 \\ 9 & 10 & 11 & 12 \\ 5 & 6 & -7 & 8 \\ 10 & 12 & 14 & 16 \end{bmatrix}$$

5. Find a *short* MatLab expression to build the matrix:

$$A = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 \\ 9 & 7 & 5 & 3 & 1 & -1 & -3 \\ 4 & 8 & 16 & 32 & 64 & 128 & 256 \end{bmatrix}$$

6. Evaluate the function

$$y = \frac{x}{x + \frac{1}{x^2}}$$

for $x = 3$ to $x = 5$ in step of 0.01 and make its plot.

7. Let be the function $y = \sin(x^2)$, $x \in [0, 2\pi]$
- make a simple plot with $x=[0:2*\pi]$ (`plot(x,y)`),
 - this might look a bit funny, so try making the step smaller,
 - add some labels (`xlabel`, `ylabel`),
 - and a title (`title`),
 - and a legend (`legend`),
 - finally add a grid (`grid on`).

Type `help plot` and use the information to change color and marker.