




## 7. Lab

# Graphics ( plot command and its related functions)

-  First, see in the lectures' part of the Laboratory manual (polycopié des TPs), the counterpart chapter of this Lab.

### 7

Please, save all the graphics you are going to create with the *File* → *Save* option in the Figure window. This should save a file with the standard Matlab format which uses a *.fig* file extension.

1. Plot the following functions :
  - $y = \frac{1}{x}$ ,  $x \in [-10, 10]$  using a dashed blue line.
  - $y = \sin(x) \cos(x)$ ,  $x \in [-20, 20]$  using a red dotted line (a dotted line).
  - $y = 2x^2 - 3x + 1$ ,  $x \in [-10, 10]$  using red star markers.

Activate the `grid` command in all your graphs and don't forget to give them axis labels (`xlabel` and `ylabel`) and titles (`title`).

2. Consider the following function :

$$s = a \cos(\phi) + \sqrt{b^2 - (a \sin(\phi) - c)^2}$$

Plot  $s$  as a function of angle  $\phi$  when  $a = 1$ ,  $b = 1.5$ ,  $c = 0.3$  and  $0 \leq \phi \leq 360^\circ$  .

3. Plot the following two functions in the same graph :

$$x = \cos(\phi) \sqrt{2 \cos(2\phi)}$$

$$y = \sin(\phi) \sqrt{2 \cos(2\phi)}$$

where :  $(-\pi/4 \leq \phi \leq \pi/4)$ .

4. Use the `subplot` command to plot the following two functions in two different plots that belong to the same graph :

$$x = e^{k\phi} \cos(\phi)$$

$$y = e^{k\phi} \sin(\phi)$$

where :  $(0 \leq \phi \leq 6\pi; k = 0.1)$ .

5. Plot the following 3D curves using the `plot3` function :

(a)

$$x = \sin\left(\frac{t}{2c}\right) \cos(t)$$

$$y = \sin\left(\frac{t}{2c}\right) \sin(t)$$

$$z = \cos\left(\frac{t}{2c}\right)$$

where  $c = 5$  et  $0 \leq t \leq 10\pi$ .

(b)

$$x = \cos(t) \sqrt{b^2 - c^2 \cos^2(at)}$$

$$y = \sin(t) \sqrt{b^2 - c^2 \cos^2(at)}$$

$$z = c * \cos(at)$$

where  $a = 10$ ,  $b = 1$ ,  $c = 0.3$ , et  $0 \leq t \leq 2\pi$ .