

Implementation

```
>> edit askAxes.m
>> plot(4,5)
>> axis
ans =

    3.6000    4.4000    4.4000    5.6000

>> figure(1)
>> |
```

Command Window

GUI

```
1 fonction [myAxes] = askPlotAxes()
2 % Ask the axes of the plot to the user
3 % they are in the form
4 % [minX maxX minY maxY]
5
6 myAxes = zeros(1,4);
7 disp('Entrer les axes ? utiliser dans le dessin')
8 myAxes(1) = input('Min X = ');
9 myAxes(2) = input('Max X = ');
10 myAxes(3) = input('Min Y = ');
11 myAxes(4) = input('Max Y = ');
12
13 % Ici il faudrait rajouter des contraintes sur les axes
```

MATLAB and Octave for beginners

Here is a solution to the program that you have to write. So let's see the function 'explainProgram'. So first word is function with a "u". So the keyword that tells that it is a function. Then here I see no input no output. Still I can write explicitly that there is no input. And then below the explanation of the program in French. So here there is a small typo in French. I cannot use accent and then I cannot use apostrophe. Well, I can but then I have to write two dashes not just one. So this double dash makes an apostrophe. OK. I can save this function and then call it. Since it doesn't need any input, I can already see if it's correct. The second function to write is 'askAxes'. So I open it. Edit 'askAxes'. But first, what are these axes? So let's see if I plot. So some points. Then I can have a look at the axes of this plot. OK. So I can ask for the axes. And here see I have numbers 3.6, 4.4, 4.4, 5.6. OK and these are the limits of my figure. So now I can understand this axes function what it does. Can also use the help function. I see this number there. I need four numbers when I want to set the axes. I have to set the minimum of X, the maximum of X then minimum Y, maximum Y in this order so my axes, it's an array with four entries.

Notes

Summary



0m 04s

Implementation

```
>> edit askEllipse.m
>> edit plotEllipsis.m
```

Command Window

```
1 function [ellipse] = askEllipse ()
2 % Ask the ellipse to the user
3 % they are in the form
4 % [c1 c2 a1 a2]
5
6 ellipse = zeros(1,4);
7 disp('Entrer l''ellipse a utiliser dans le dessin')
8 ellipse(1) = input('Centre, coordonnee x = ');
9 ellipse(2) = input('Centre, coordonnee y = ');
10 ellipse(3) = input('Axes le long de x = ');
11 ellipse(4) = input('Axes le long de y = ');
12
13 end
```

MATLAB and Octave for beginners

So now I can ask the new axes. Oops! There is a mistake. Again function with a "u". And then I can call it again after saving. OK. Now for example I would like to draw between 1 and 5 in the X-direction and between -3 and 10 in the Y-direction. Good. So 'askAxes' 'askPlotAxes' gives me an array before entries but how to use them. Well, with the function Axes, I can change them. So I can call Axis (myAxis). And here is mistake. So now I can have the modified Axes function. It will take the axes that are defined by the user and then modify the plot. So I can have a look at this modified axes. So it's empty my input is an array. I call it 'myAxis'. And then I can simply say Axis of myAxis. And that's it. The fourth function we need to write is 'askEllipse' function. This function is like the function that asks the access to graph. OK. We get an ellipse with a vector of four entries which contains the center of the ellipse in the X and Y coordinates and then the axes in the X and Y directions. OK. So we need to ask these four entries and we put them in a single array called ellipse. And then we need to draw this ellipse.

Notes

Summary



2m 21s

Implementation

```
>> edit askEllipse.m  
>> edit plotEllipsis.m  
>> |
```

Command Window

GUI

```
1 function plotEllipse(ellipse, Npoints)  
2 % plots an ellipse with Npoints points defined by the  
3 % ellipse (x-c1).^2/ a1^ + (y-c2).^2/a2 <= 1 where  
4 % the parameters are given in the  
5 % ellipse parameter as [c1 c2 a1 a2]  
6 % color is a string for the plot command  
7  
8 c1 = ellipse(1);  
9 c2 = ellipse(2);  
10 a1 = ellipse(3);  
11 a2 = ellipse(4);  
12  
13 % parameter of the ellipse  
14 t = linspace(0, 2*pi, Npoints);  
15  
16 % parameterisation of the ellipsis  
17 plot(c1 + a1*sin(t), c2 + a2*cos(t));  
18  
19 end
```

MATLAB and Octave for beginners

So this is the function that given an ellipse function and points, it will draw the ellipse that is given with this data. So for clarity, we first define c1 c2 and then a1 a2. I also change the name here because there was a little mistake in the name.

Notes

Summary



4m 30s

Implementation

```
definir les limites de la figure  
dessiner un ellipse defini par l'  
utilisateur  
charger le fichier des ellipses e  
t les dessiner  
demander la precision du dessin,  
par default 200 points;  
nettoyer la figure  
sortir  
Fait ton choix
```

```
[ 1] explique  
[ 2] change les axes  
[ 3] dessine un ellipse  
[ 4] dessine les ellipse dans l  
e fichier  
[ 5] change la precision  
[ 6] nettoie la figuer  
[ 7] sort du programme
```

```
pick a number, any number: 2  
Entrer les axes ? utiliser dans l  
e dessin  
Min X = 1  
Max X = 3  
Min Y = 0  
Max Y = 5
```

Command Window

GUI

```
16 % - utiliser des fonctions dans une fichier .m  
17 % - documenter les fonctions et le programme principal  
18  
19 clear all;  
20 close all;  
21  
22 choice = 1;  
23 while choice ~= 7  
24  
25     switch choice  
26     case 1  
27         explainProgram;  
28     case 2  
29         myAxes = askAxes;  
30         modifyAxes (myAxes);  
31     case 3  
32         ellipse = askEllipse;  
33         plotEllipse(ellipse, Npoints);  
34     case 4  
35         loadFileAndPlot(Npoints);  
36     case 5  
37         Npoints = askPrecision;
```

MATLAB and Octave for beginners

So I have N points and the ellipse defined by these variables inside ellipse. I want just the perimeter so I will have to say equal to 1. As I was saying here I record the variables c1 c2 a1 a2 with data from ellipse and then I have a parameter 't' which is a space between 0 and 2π with N points and then I can plot the parametrical curve which is c1 center in the X-direction plus a1 sine of 't' and then comma c2 plus a2 cosine of 't'. Then this will draw a parametrized ellipse. Now we can try the program. Try go back to mine main program which is called plot. And if I make the choice between 1 and 3 it should work and we can try it. 'callPlot'. For example I choose the explanation number 1 and I have the explanation now. I want to give a new choice. I want to change the axes for number 2 and then I give the new axes. Oops! There is a mistake. 'myAxis' is not defined. OK. I see that there is a mistake here and I can correct it. The 'e' instead of an 'i'. Now I can call again my main and I want to give new axes so again number 2 and I go with the axes. So I test a little bit.

Notes

Summary



5m 04s

Implementation

```
definir les limites de la figure  
dessiner un ellipse defini par l'  
utilisateur  
charger le fichier des ellipses e  
t les dessiner  
demander la precision du dessin,  
par default 200 points;  
nettoyer la figure  
sortir  
Fait ton choix
```

```
[ 1] explique  
[ 2] change les axes  
[ 3] dessine un ellipse  
[ 4] dessine les ellipse dans l'  
e fichier  
[ 5] change la precision  
[ 6] nettoie la figure  
[ 7] sort du programme
```

```
pick a number, any number: 3  
Entrer l'ellipse a utiliser dans  
le dessin  
Centre, coordonnee x = 2  
Centre, coordonnee y = 3  
Axes le long de x = 1  
Axes le long de y = 1.5
```

Command Window

GUI

```
22 Npoints = 200;  
23  
24 choice = 1;  
25 while choice ~= 7  
26  
27     switch choice  
28     case 1  
29         explainProgram;  
30     case 2  
31         myAxes = askAxes;  
32         modifyAxes (myAxes);  
33     case 3  
34         ellipse = askEllipse;  
35         plotEllipse(ellipse, Npoints);  
36     case 4  
37         loadFileAndPlot(Npoints);  
38     case 5  
39         Npoints = askPrecision;  
40     case 6  
41         clf  
42     end  
43
```

MATLAB and Octave for beginners

Here is the figure. I can place it where ever I want. And I see that I didn't draw an ellipse and now I would like to draw an ellipses number 3 and I see the center with the first coordinate, the second coordinate axes along X and then along Y. Again a mistake so I can go back where I see the mistake. 'Npoints' is not defined. Well, at some point we need to say that it is here is below maybe we should initialize it to something meaningful. So I say at the beginning 'Npoints' will see 200 as default, so I give 200 as default. So that it is defined. OK. So even if we didn't yet choose the number of points those are defined as the default. Now as I just like to continue draw my ellipse. So number 3. OK.

Notes

Summary



7m 07s

Implementation

```
>> edit loadFileAndPlot
```

Command Window

```
24 hold on
25
26 choice = 1;
27 while choice ~= 7
28
29     switch choice
30     case 1
31         explainProgram;
32     case 2
33         myAxes = askAxes;
34         modifyAxes (myAxes);
35     case 3
36         ellipse = askEllipse;
37         plotEllipse(ellipse, Npoints);
38     case 4
39         loadFileAndPlot(Npoints);
40     case 5
41         Npoints = askPrecision;
42     case 6
43         clf
44     end
45 end
```

GUI

File Browser

MATLAB and Octave for beginners

Here is the new figure. with an ellipse Remember. It's a new figure because at the beginning of the script I did the clear all and close all. Now I can choose the new axes. For example between 0 and 4 and 1 and 5. And here I see my new drawing with the same ellipse. And if I draw a new ellipse I would like it to be drawn on the top of the first one. But if I take option 3, my ellipse would be crushed. So I stop the program with 7. And I will slightly modify my program so that the ellipse is not crushed by the first one. So I open a figure here right at the beginning. And from the beginning I say, hold on, so that every plot will be done in top of the other. So the figure will continuously be reused. So now 'loadFileAndPlot'. Let's see what this function does and how does it work.

Notes

Summary



8m 20s

Implementation

```
>> callPlot
choix du programme
explication du programme
definir les limites de la figure
dessiner un ellipse defini par l'
utilisateur
charger le fichier des ellipses e
t les dessiner
demander la precision du dessin,
par default 200 points;
nettoyer la figure
sortir
Fait ton choix
```

```
[ 1] explique
[ 2] change les axes
[ 3] dessine un ellipse
[ 4] dessine les ellipse dans l
e fichier
[ 5] change la precision
[ 6] nettoie la figuer
[ 7] sort du programme
```

Command Window

GUI

```
1 function [] = loadFileAndPlot (Npoints)
2 % charge le fichier donne et dessine toutes les ellipse du fichier.
3
4 AllEllipses = load('cheeseEllipse.txt');
5
6 for ellipse = AllEllipses'
7
8     plotEllipse(ellipse,Npoints);
9
10 end
11
12 end
13
```

MATLAB and Octave for beginners

So it need to load a specific file, which we already have. You should download it from the website. And in there, there are many ellipses, so many vectors with four entries and here I will say OK. All ellipses have to be loaded from the file 'chooseEllipse' cheeseEllipse.txt. So on each line there is an ellipse which is defined. So what I can do is a loop on each of the line. So each line is an ellipse. So I can say, 'for ellipse' equal to all of these ellipses. So what it does is it make a loop on the columns of a matrix. So I need to transpose this so this will actually do a loop on the lines of the matrix. So for each line I want to plot the ellipse. OK. So I can call my plot function, 'plotEllipse'. And what are the inputs are an ellipses and number of points. And number of points was already given as an input to the load file and plot function. So everything is there. We can try our new function. 'callFile'.

Notes

Summary



9m 51s

Implementation

```
[ 2] change les axes  
[ 3] dessine un ellipse  
[ 4] dessine les ellipse dans l  
e fichier
```

```
[ 5] change la precision  
[ 6] nettoie la figuer  
[ 7] sort du programme
```

```
pick a number, any number: 3  
Entrer l'ellipse a utiliser dans  
le dessin  
Centre, coordonnee x = 300  
Centre, coordonnee y = 300  
Axes le long de x = 20  
Axes le long de y = 50  
Fait ton choix
```

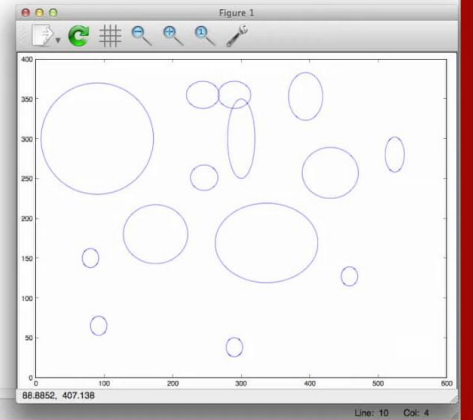
```
[ 1] explique  
[ 2] change les axes  
[ 3] dessine un ellipse  
[ 4] dessine les ellipse dans l  
e fichier  
[ 5] change la precision  
[ 6] nettoie la figuer  
[ 7] sort du programme
```

```
pick a number, any number: |
```

Command Window

GUI

```
1 function [] = loadFileAndPlot (Npoints)  
2 % charge le fichier donne et dessine toutes les ellipse du fichier.  
3  
4 AllEllipses = load('cheeseEllipse.txt');  
5  
6 for ellipse = AllEllipses'  
7  
8     plotEllipse(ellipse,Npoints);  
9  
10 end  
11  
12 end  
13
```



MATLAB and Octave for beginners

OK. Good plot. New figure. I choose number 4. And I see all these ellipses. OK. It was loaded and directly plot on my figure. I think one is missing. For example I want to put one ellipses in 300 300, with an axes in X equal to 20 and in Y equal to 50 and here I added my new ellipses.

Notes

Summary



11m 45s

Implementation

Command Window

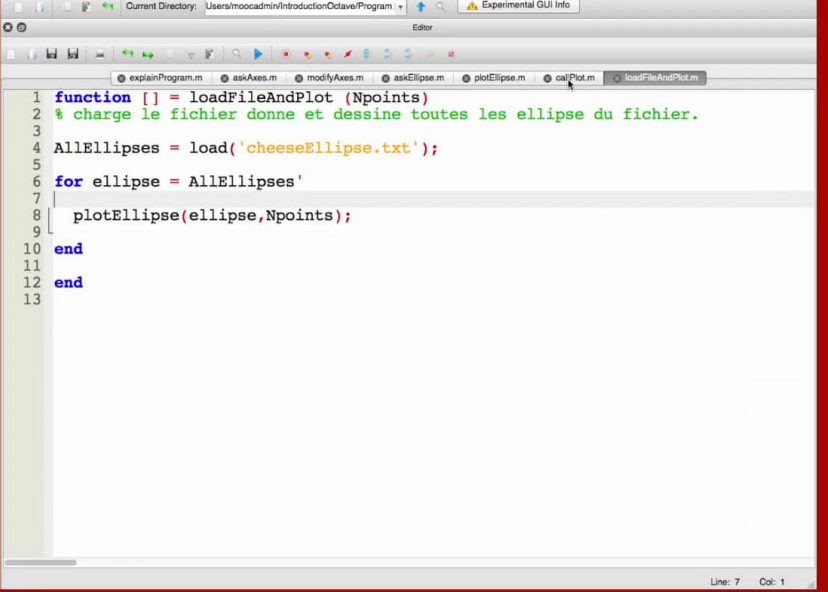
```
[ 2] change les axes
[ 3] dessine un ellipse
[ 4] dessine les ellipse dans l
e fichier
[ 5] change la precision
[ 6] nettoie la figuer
[ 7] sort du programme

pick a number, any number: 3
Entrer l'ellipse a utiliser dans
le dessin
Centre, coordonnee x = 300
Centre, coordonnee y = 300
Axes le long de x = 20
Axes le long de y = 50
Fait ton choix

[ 1] explique
[ 2] change les axes
[ 3] dessine un ellipse
[ 4] dessine les ellipse dans l
e fichier
[ 5] change la precision
[ 6] nettoie la figuer
[ 7] sort du programme

pick a number, any number: |
```

GUI



```
1 function [] = loadFileAndPlot (Npoints)
2 % charge le fichier donne et dessine toutes les ellipse du fichier.
3
4 AllEllipses = load('cheeseEllipse.txt');
5
6 for ellipse = AllEllipses'
7
8     plotEllipse(ellipse,Npoints);
9
10 end
11
12 end
13
```

MATLAB and Octave for beginners

What remains to be done?

Notes

Summary



Implementation

Command Window

```
[ 2] change les axes
[ 3] dessine un ellipse
[ 4] dessine les ellipse dans le fichier
[ 5] change la precision
[ 6] nettoie la figuer
[ 7] sort du programme

pick a number, any number: 3
Entrer l'ellipse a utiliser dans le dessin
Centre, coordonnee x = 300
Centre, coordonnee y = 300
Axes le long de x = 20
Axes le long de y = 50
Fait ton choix

[ 1] explique
[ 2] change les axes
[ 3] dessine un ellipse
[ 4] dessine les ellipse dans le fichier
[ 5] change la precision
[ 6] nettoie la figuer
[ 7] sort du programme

pick a number, any number: |
```

GUI

```
24 hold on
25
26 choice = 1;
27 while choice ~= 7
28
29     switch choice
30     case 1
31         explainProgram;
32     case 2
33         myAxes = askAxes;
34         modifyAxes (myAxes);
35     case 3
36         ellipse = askEllipse;
37         plotEllipse(ellipse, Npoints);
38     case 4
39         loadFileAndPlot(Npoints);
40     case 5
41         Npoints = askPrecision;
42     case 6
43         clf
44     end
45
46     choice = menu('Fait ton choix','explique', 'change les axes', ...
47                 'dessine un ellipse', 'dessine les ellipse dans le fichier', ...
48                 'change la precision', 'nettoie la figuer', 'sort du programme');
49
50 end
51
```

MATLAB and Octave for beginners

If I call call plots, I load file and plot. So now, it's 'askPrecision'. OK. 'askPrecision' is very similar to 'askAxes'. It will just prompt for an input.

Notes

Summary



12m 35s

Implementation

```
>> edit askPrecision.m
>> 
```

Command Window

GUI

```
1 function [Npoints] = askPrecision ()
2 % Demande la precision avec laquelle dessiner
3
4 Npoints = input('Entrer la precision avec laquelle dessiner ');
5
6 % Il faudrait aussi faire des controles sur la donnee
7
8 end
9
```

Line: 6 Col: 54

MATLAB and Octave for beginners

We will add the function 'askPrecision', so that we can recover some of the work. So we have N points here and then here we have the input. Well, what we didn't do is to check that the input data is correct. Now we have implemented all the functions.

Notes

Summary



12m 52s

Implementation

```
>> edit askPrecision.m
>> 
```

Command Window

```
24 hold on
25
26 choice = 1;
27 while choice ~= 7
28
29     switch choice
30     case 1
31         explainProgram;
32     case 2
33         myAxes = askAxes;
34         modifyAxes (myAxes);
35     case 3
36         ellipse = askEllipse;
37         plotEllipse(ellipse, Npoints);
38     case 4
39         loadFileAndPlot(Npoints);
40     case 5
41         Npoints = askPrecision;
42     case 6
43         clf
44     end
45
46 choice = menu('Fait ton choix','explique', 'change les axes', ...
47 'dessine un ellipse', 'dessine les ellipse dans le fichier', ...
48 'change la precision', 'nettoie la figuer', 'sort du programme');
49
50 end
51
```

GUI

MATLAB and Octave for beginners

And some of them maybe improved.

Notes

Summary

13m 32s



Conclusion



We have created a program consisting of several functions. Before implementing each of them we have identified the functions and defined the framework. For each function we have defined inputs and outputs. This allowed us to divide the work well and possibly to share the work between developers. I suggest that you use the same approach each time you have to write a new program. Of course, this was a first introduction to MATLAB octave. The best way is to continue learning using it in a daily practice. Remember to search the internet. There are often answers to your questions. Thank you very much for following this course. I hope that you enjoyed it. Bye.

Notes

Summary



13m 36s