

Build-in functions

sin	sinh	asin	asinh	cos	cosh	acos	acosh
tan	tanh	atan	atanh	atan2	atanh	sec	asec
asech	csc	csch	acsc	acsch	cot	coth	acot
exp	log	log10	log2	pow2	sqrt	nextpow2	abs
angle	conj	imag	real	unwrap	isreal	cplxpair	fix
floor	ceil	round	mod	rem	sign	airy	besselj
bessely	besselh	besseli	besselk	beta	betainc	betaln	ellipj
ellipke	erf	erfc	erfcx	erfinv	expint	gamma	gammainc
gammainl	legendre	cross	factor	isprime	primes	gcd	lcm
rat	rats	perms	cart2sph	cart2pol	pol2cart	sph2cart	hsv2rgb

Notes

We will now see functions, not mathematical functions but functions at the programming level closely a function is constituted by input variables by some work that is done and then output variables. okay. So we take input variables to treat them do a series of precise operations and then we have an output from these calculations so input, algorithm, output. In this algorithm we we can do several things among others call other functions There are at least four kind of possible functions so there are building functions which are already in the system and you don't need to call them they are and they work as you expect then you have functions that you can define using MATLAB files so dot M files then there are you describe all the algorithm there are anonymous functions or the call also called lambda functions and then inline functions we will see all of these four kind of functions. There are the building functions that are available already in octave and MATLAB. Here is the full list There are really a lot there are also functions that we already used as plot legend or title. Those were functions integrated in MATLAB that are available for different things draw write them something in the screen and so on. There was also this to display strings character on screen.

Summary



User defined functions

```
>> edit fonctionExample.m
>>
```

Command Window

```
1 function [retval] = fonctionExample (A, x)
2
3
4
5 end
6
```

GUI

MATLAB and Octave for beginners

Now I want to create a new function when I create it we can do it again with the common edit just like we did for a script for my new function I say I want to do a function example of them so edit function example at M I create a new file but now I don't want to erase everything I just erase the comments and then I will use the structure that is given by octave so we have the function so this keyword is there is important see say that this is not a script, it's a function and then the function ends with end function in OCTAVE or just end. so end it's very easy, we can put it there so I see the name of the function here It is very important that it is the same name as define okay so put the same name here as the name of the file. otherwise, will not work We will get warnings and then you are not sure about just going to happen. So next to the function name we have the input You can have one, two, zero inputs depends on what you want to do these are the parameters that you need to give to your function for example have a matrix A and the vector X so just called a and X so they will, this will be given and then I have the result b.

Notes

Summary

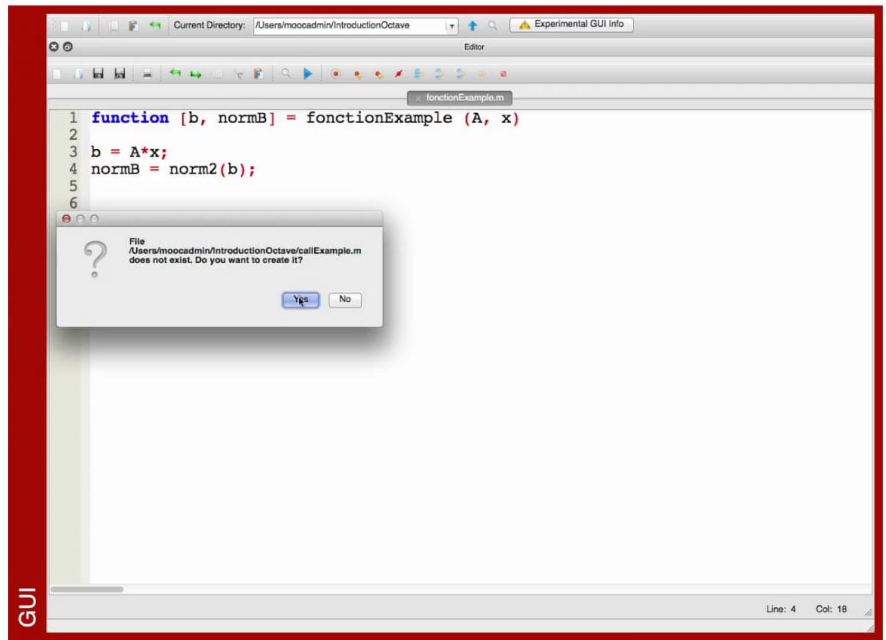


1m 46s

User defined functions

```
>> edit fonctionExample.m  
>> edit callExample.m
```

Command Window



MATLAB and Octave for beginners

In this case the output is just b and in the function have my algorithm which says b is equal to ax . So I save the function and then I can call it from give it in the common window well, for this function I will need to give two inputs a and x . I don't need to specify what is a and x . So the essential thing is that this a and x are then suited for computation a times x which is c here. okay and then the b is a result of the computation I can also add other outputs like the norm of b . Then I can say norm b is equal to two norm of the vector b .

Notes

Summary

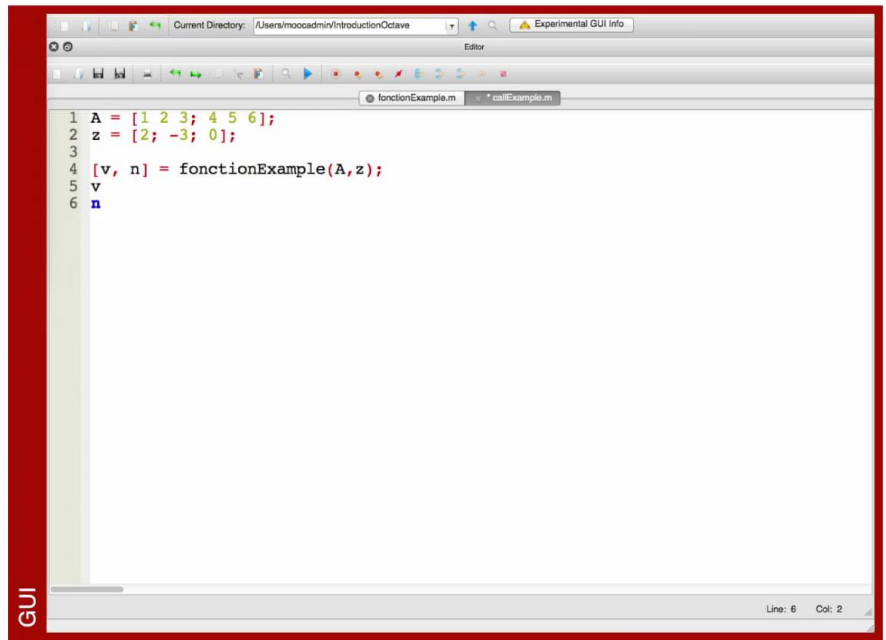


3m 29s

User defined functions

```
t line 4, column 7
error: /Users/moocadmin/Introduct
uctionOctave/callExample.m at li
ne 4, column 6
>> norm
norm      normest  normpdf
normcdf   norminv  normrnd
>> norm(z)
ans = 3.6056
>>
```

Command Window



MATLAB and Octave for beginners

then I put semicolon so that nothing is seen So now I create a script for example dot m that will call this function so let's say in this script I define a matrix A then I define a vector z okay this z would be use as input instead of the x that I seen the function. It has to be a colon vector So that is compatible with my matrix A and then it three entries because my matrix is a has a 3 columns and now I can call my function. My function gives me 2 in outputs so a vector accordingly and then in norm equally n and then this is the way I have to write this call to the function example and for example I have to give my input which are In this case a and z okay it's it doesn't need to be a and x what is essential is that here I give my parameters and then I can call the function and get the output Now can run the script a there is an arrow let me see arrow no 2 is under find so I have to go inside my script or inside my function to see where is my error so norminv z exist but norm to of z doesn't exist go back to my function I do it small correction now everything is alright, they can run the script okay now I have the result a dot tec a times x is equal to the sector v and then it's norm is h dot zero six.

Notes

Summary



4m 24s

User defined functions

```
-7  
n = 8.0623  
>> b  
error: 'b' undefined near line 1  
column 1  
>> normB  
error: 'normB' undefined near li  
ne 1 column 1  
>> |
```

Command Window

```
function [b, normB] = fonctionExample (A, x)  
1  
2  
3 b = A*x;  
4 normB = norm(b);  
5  
6  
7 end  
8
```

GUI

MATLAB and Octave for beginners

a it took this matrix a here which is the same that is there and then as I said there is no need to have the same name of the variables. okay so A is the same name but z here changes name and Now is Z a x okay from z to x so in this function x takes the value of the z vector which is outside What we should be attention to? The first thing I check is whether b exists.

Notes

Summary



6m 37s

User defined functions

```
>> callExample
>>
```

Command Window

```
1 A = [1 2 3; 4 5 6];
2 z = [2; -3; 0];
3
4 [v, n] = fonctionExample(A,z);
5
```

GUI

MATLAB and Octave for beginners

okay, o but b is not defined you see because b is only defined within the function outside the function this b doesn't exist any more it is given the value to b to v so v is equal to the first output of the function and then second one norm b is also not defined in my command window because the value of norm b is a sign to the variable n so here n is defined it is the second output similarly if you take hi a here and you change the matrix a to something else we will not see the changes outside okay so you take a as a copy but then if you change it and say equal to zero and x equal to zero so this two input we will not be modified by the code the function okay, so now I run the script again I check what is A an A did not change the value okay you see is still equal to the original matrix So within the function they input variables are protected in the sense that you can change them but we now see the difference is outside and the same is for the variables The variables a that you define within the function are not available outside of it.

Notes

Summary



7m 20s

User defined functions

```
column 1
>> z
z =
    2
   -3
    0
>> clear all
>> clc
```

Command Window

```
1 function [b, normB] = fonctionExample (A, x)
2
3 b = A*x;
4 normB = norm(b);
5
6 A = 0;
7 x = 0;
8
9 end
10
```

GUI

MATLAB and Octave for beginners

so x is not available but z is because it is a sign to the first output of this function sorry because it is defined already before so remember first line has to begin with a keyword function then you have the outputs between brackets so you can have one or more outputs then you have the equal sign and then you have the function name if you remove the output then means this function doesn't have any output then here you have a the inputs a and x you can have zero, one, two or more inputs so here are the lines describing your algorithm.

Notes

Summary

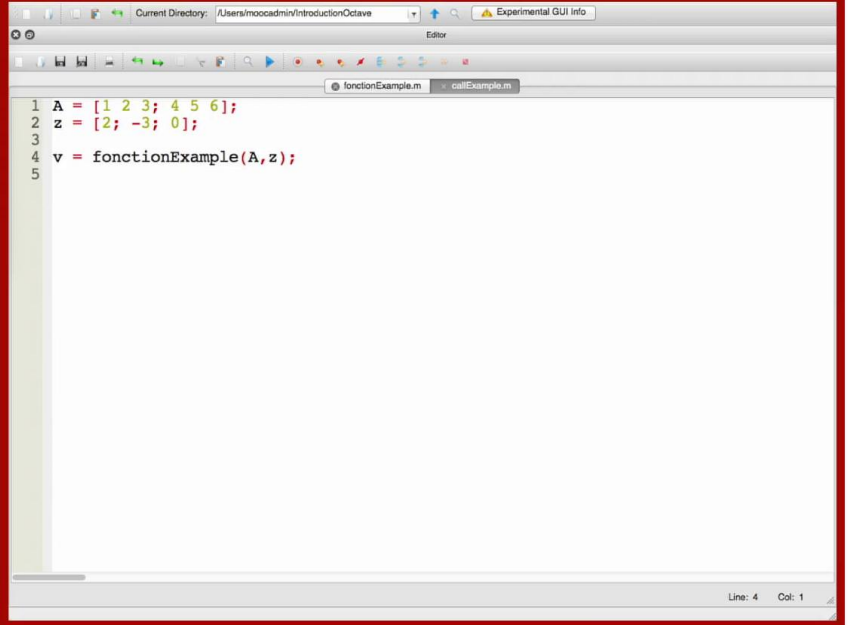


9m 08s

User defined functions

```
>> callExample  
>> v  
v =  
  
    -4  
    -7  
  
>> |
```

Command Window



```
1 A = [1 2 3; 4 5 6];  
2 z = [2; -3; 0];  
3  
4 v = fonctionExample(A,z);  
5
```

GUI

MATLAB and Octave for beginners

If you do not set b inside the body of the function Del then you will get a narrow because the output variable is not define There is also another feature I clear everything here clear all, I clear my screen I go to my script Now if you are not interested in this second output I can just write v equal to function example a x so now the second output is just forgotten okay, you can just recall the first output and the second you just forget about it is not defined.

Notes

Summary



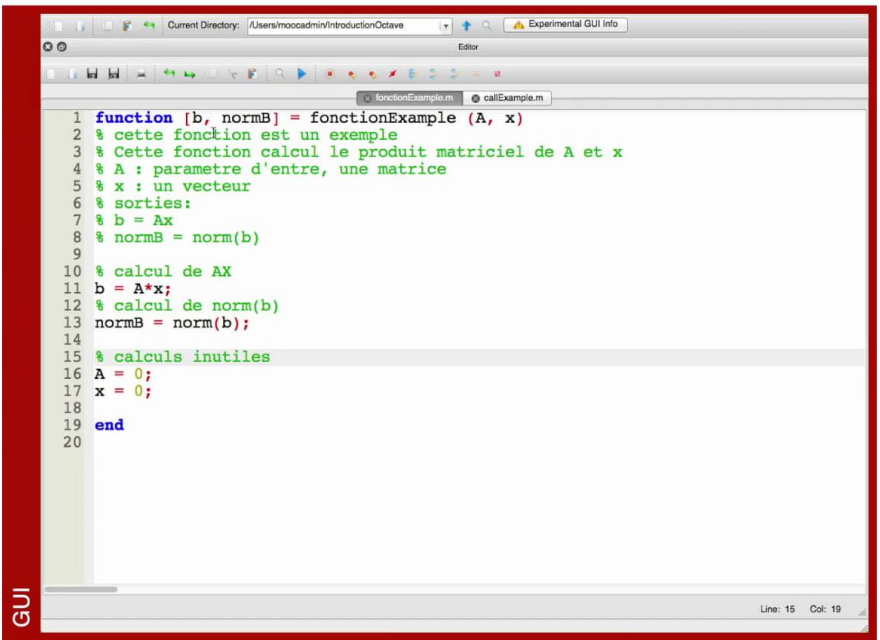
10m 14s

User defined functions

```
Cette fonction calcul le produit  
matriciel de A et x  
A : parametre d'entre, une matrice  
x : un vecteur  
sorties:  
b = Ax  
normB = norm(b)
```

Additional help for built-in functions

Command Window



```
1 function [b, normB] = fonctionExemple (A, x)  
2 % cette fonction est un exemple  
3 % Cette fonction calcul le produit matriciel de A et x  
4 % A : parametre d'entre, une matrice  
5 % x : un vecteur  
6 % sorties:  
7 % b = Ax  
8 % normB = norm(b)  
9  
10 % calcul de AX  
11 b = A*x;  
12 % calcul de norm(b)  
13 normB = norm(b);  
14  
15 % calculs inutiles  
16 A = 0;  
17 x = 0;  
18  
19 end  
20
```

MATLAB and Octave for beginners

now I want to add some commands to my function in particular I would like to provide a documentation in after the first line of the function like in script I can put a help, so small description this function is an example and then I can describe more explicitly what it does so a is a first input parameter so a matrix and then the second one x is also an input is a vector and then I can add some other commands okay so you see we have commands line all starting with ampersand with a percentage sign and I can write as much help as I want I can say now what are the outputs The outputs are b so is equal to a dot x and then the norm b it's the norm of the vector b I can go on the command window and type help fonctionExemple and then I will get some help on my function we can go up a little bit and they see all the text that ever wrote in the lines following the first one okay cette fonction est un exemple cette fonction this function is an example and then it computes the product a x then we also need to put some comment on the algorithm side so you see I live here a free line a line without anything so that my help actually ends there and here I can put simple help on the computations that I do first computation of a X and then the computation of the norm and then I have to remove these lines or just say these are useless computations So now my function is complete.

Notes

Summary



11m 01s