Scilab Tutorial
What is it?

Scilab is an open source software package for numerical computations. It is a high-level language similar to Matlab. As in Matlab, it is convenient to work with vectors and matrices, and to do linear algebra operations. Therefore, it is perfect for network analysis.

Where is it?

You can download it from www.scilab.org. There are versions for Windows, Mac, and Linux.

Where can you find help?

Using Google you can find examples for pretty much anything you want to do.
Vectors

Column vector: \[ v = [0;1;2] \]

Row vector: \[ v = [0 \ 1 \ 2] \]

Operations: \[ w = u + v \]

Element: \[ w(2) \] gives 2\textsuperscript{nd} element
\[ x = w(2) \] assigns that number to scalar \( x \)

Dimensions: \[ \text{size}(v) \] will print out the number of rows and columns in \( v \)

Vector length: \[ \text{norm}(v,1), \text{norm}(v,2) \text{ or } \text{norm}(v), \text{norm}(v,'inf') \] gives 1-, 2-, \( \infty \)- norms

Element-by-element multiplication: \[ u.*v \] creates a vector

Dot product: \[ \text{sum}(u.*v) \]
Matrices

Example of 2x3 matrix: \[ A=\begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix} \]

Transpose: \[ A' \]

Multiplication: \[ A*B \]

Vector of column sums: \[ v=\text{sum}(A,1) \]

Vector of row sums: \[ v=\text{sum}(A,2) \]

Sum of all elements: \[ \text{sum}(A) \]

Single column of a matrix: \[ v=A(:,3) \] puts third column into vector \( v \)

Single row of a matrix: \[ v=A(3,:) \] puts third row in vector \( v \)

Eigenvalues/eigenvectors: \[ [c,d]=\text{spec}(A) \] creates diagonal matrix \( d \) with eigenvalues in main diagonal and matrix \( c \) whose columns are eigenvectors
Loops, Conditionals, Maxima

Example of a “for loop”:

```plaintext
x=0
for i=1:3
  x=x+1;
end
```

Example of simple conditional statement:

```plaintext
if a(1,1) == 1 then
  selfedge=1;
else selfedge=0
end
```

Finding the element with the largest value in a matrix or vector, and its index:

```plaintext
[mx,mxind]=max(v)
```

or

```plaintext
[mx,mxind]=max(A)
```

where mx will give a max value and mxind will give the index for this. There is a similar command for minima.
Scilab script files

These script files have the extension "*.sce", so for example "filename.sce"

They contain commands just like those you type at command lines interactively.

The characters "//" denote a comment

You can create and edit a .sce file using any text editor, or by launching SciNotes from within scilab

Execute a script file by typing “exec(’path and filename’)” or by moving to the correct directory from within scilab and right-clicking on the file you want to execute.

The execute command has 3 options: 
exec(filename,-1) executes but prints nothing
exec(filename,0) executes and prints output
exec(filename,1) executes and prints everything

A semi-colon at the end of a line suppresses output
Scilab function files

These function files have the extension ".sci", so for example "filename.sci"

They contain one or more function definitions.

Executing a function file just reads it into the scilab session. It does not get executed until the function is called.

To call the function just type the function name with appropriate input: myfunc(myinput)
Run Scilab and execute matrix_ops.sce
Next execute funcs.sci