Linear Algebra & Image Processing matlab case2 instructions:
Cases studies Econometric Model and Traffic Network.

Before starting with these MATLAB case studies we will
download appropriate files from the book site on Internet:
files *.m and datasets needed

Start your favourite browser and go to:
www.laylinalgebra.com
click on the book (3rd updated edition lower one)
click on case and applications
within case studies download
matlab_cs.zip to a matlab subdirectory

Leave the browser and go to your matlab subdirectory
extract matlab_cs
(for instance with: gunzip matlab_cs.zip)

The exercises and case studies that go with the book
are now available as well as the datasets.

Exercise questions for case 1:
1
First make a graph of table2 using directed arrows/connections
for the flow of money; in which direction do they point.
2
Can you draw a planar graph (directed connections that
nowhere cross each other) for this situation?
3
Write down the equilibrium equations for table2 and
compare the set of equations obtained with those in the case study.
4
Solve the homogeneous set of equations:
The datasets are in case1.m
The solution for Ax=b with x and b column vectors
is found by entering vector b (zero-vector in
matlab with b=[0;0;0;0;0]) and adding it to
matrix A with: Aug=[A,b]
This is solved with: S=rref(Aug)
5
Inspect the solution and indicate which variables are
basic and which are free and write the basic variables
as a function of the free ones.
6
If additionally is given that the total stream of money
amounts to 802.04 billion dollar, how much money goes
around in each of the sectors?

Traffic Network case

The dataset for this case study can be found in network.m
Exercise questions for the network case:
1
What can you say about the number of cars arriving at and leaving
a crossing when averaged over some time-period (hour, day)?
2
Use the graphic depiction in figure 3 of the case study
to set up an equation for each crossing and
produce the appropriate augmented matrix.
3

Compare your augmented matrix with the one that is given in the case study and when different find out why.

4

One can also create the augmented matrix by calling network.m

5

Find out what the total net trafficstream within the network is by summing all 12 rows of the augmented matrix in the last row (using rowcombine for instance)
Is the net traffic stream 0?

6

Use rref to solve the augmented matrix found in 2.

7

How many basic and free variables are there?

8

Which closed loops within this network allow a traffic stream that can not be noticed at the boundary of the network?

When ready with these 2 cases one can also try to solve the network case around the White House and/or the watersupply network documented in the pdf file.