

# Matlab Homework Set 1 (Due Friday, Oct 14)

Solve the following problems using Matlab, then “publish” the results and upload them to your CLEo folder which you’ll call “Matlab Homework 1”.

1. Let  $A$  be a  $5 \times 8$  matrix with elements taken at random from a uniform distribution on  $[0, 1]$  (this is the “rand” command). Type out the Matlab commands that: (a) creates matrix  $A$ , (b) finds the row mean, column mean and grand mean, then (c) double centers the matrix (put the result as matrix  $B$ ). (d) Show that `mean(B,1)` and `mean(B,2)` are both zero vectors.
2. Here’s an example to type into Matlab (it is actually Exercise 3 from the last page of the stats notes):

```
x=[2.5 2.6 3.4 1.3 1.6 3.8 11.6 6.4 8.3];  
t=[147 130 130 114 138 162 208 178 210];
```

```
A=[x' ones(9,1)];  
c=inv(A'*A)*A'*t';
```

```
xnew=linspace(min(x),max(x));  
yout=c(1)*xnew+c(2);
```

```
plot(x,t,'*',xnew,yout,'k-');
```

3. Use the last exercise as a template for Matlab. Suppose we have a model discrete predator prey system of equations:

$$\begin{aligned}f_{n+1} - f_n &= -a_1 f_n + b_1 f_n r_n \\ r_{n+1} - r_n &= a_2 r_n - b_2 r_n f_n\end{aligned}$$

Download the file `predpreydata.mat` from the class website. We load the data into Matlab by typing (in the command window): `load predpreydata` (notice that we do not use the .mat suffix).

At this point, you should be able to check that vectors  $f$  and  $r$  have been loaded into the workspace.

We’ll discuss how to start in class, but see if you can write up a script that will find values for  $a_1, a_2, b_1, b_2$ . Here’s how the script would start:

```
load predpreydata  
plot(1:size(f),f,1:size(r),r); %Plot the curves first
```

```
A=?  
t=?  
c=?
```