

Phys.494-Spring 2008  
**MATLAB-2**

[A] **ARRAYS**

Set the shape (row or column) and size of an array, that is, a vector, before a loop assigns it values:

Type at the command prompt:

```
>> n=5;
>> a=1;
>> h=a/(n-1);
>> x=zeros(1,n);           % 1 row, n column matrix
>> for k=1:n,
    x(k)=h*(k-1);
end
>> x
>> fx=sin(2*pi*x)
>> y=zeros(n,1);         % n row, 1 column matrix
>> for k=1:n,
    y(k)=h*(k-1);
end
>> y
>> fy=sin(2*pi*y)
```

**VECTORIZATION**

A loop is replaced with a single operation.

Row vectors (arrays) whose components are equally placed:

```
>> x=0: 0.25 :1           % 1 row, n column matrix
>> x=linspace(0,1,5)     % same as above
You may also achieve equal logarithmic spacing:
>> logspace(-2,2,5)
>> log10(2)\
>> logspace(0,log10(2),13)
```

## [B] SCRIPT FILES

Script file enables avoiding typing at the prompt. An example: Save a text file as "PlotSine.m" in a convenient directory! (At hbar you are not permitted to save m-files under the *work* directory)

```
% Script File: PlotSine.m
%
%Prints and plots a short table of sine evaluations.
%
%
n=21;
x=linspace(0,1,n);
y=sin(2*pi*x);
disp('')
disp(' k x(k) sin(x(k))')
disp('-----')
for k=1:21,
    degrees=(k-1)*360/(n-1);
    disp(sprintf(' %2.0f %3.0f %6.3f ',k,degrees,y(k)))
end
disp('')
disp('x(k) is given in degrees.')
disp(sprintf('One degree=%5.3e Radians', pi/180))
plot(x,y)
title('The function y=sin(2*pi*x)')
xlabel('x (in radians)')
ylabel('y')

plot(x,y)
title(sprintf('Plot using n= %3.0f points. '),n)
```

Change directory and go to the folder you saved the "PlotSine.m" file. (use cd commands and then check that you are at the correct directory by pwd command.)

Then type at the prompt:

```
>> PlotSine
>> help PlotSine
```