Matlab is an interactive tool for numeric computations and it is popular in:

- business with scientific focus
- finance
- engineering
- geology
- fields that use visualization

The basic data types are:
- floats
- character
- logical

The basic data structure is a matrix.
- shape
- content

Where does computation occur? **Workspace**

What is the default interface? **Command Window**

Commands are entered and text displayed therein

**Not** a notebook as in Maple or Mathematica. More later.
Matrices

Creation

```matlab
>> zeros(3,2)
ans =
    0     0
    0     0
    0     0

>> ones(2,2)
ans =
     1     1
     1     1

>> eye(3)
ans =
     1     0     0
     0     1     0
     0     0     1

>> A = [1 2 3; 4 5 6; 7 8 9]
A =
     1     2     3
     4     5     6
     7     8     9
```
A(3,3) = 8

A =

1     2     3
4     5     6
7     8     8

det(A)
ans =

3

b = [2 5 7]';

A(0,1)
??? Index exceeds matrix dimensions.

A(:,2)
ans =

2
5
8

A(2,:)
ans =

4     5     6
>> A([1 1],:)
an =

  1   2   3
  1   2   3

>> A([3 2 1],:)
an =

  7   8   8
  4   5   6
  1   2   3

>> who

Your variables are:

A    ans    b

You can concatenate matrices to build larger ones.

>> Ab = [A b]

Ab =

  1   2   3   2
  4   5   6   5
  7   8   8   7
Some Matlab functions return multiple outputs as in the size calculation

```matlab
»[n,q] = size(Ab)

n = 
     3
q = 
     4

»p = 1:n
     <-- : is a sequencing operator

p = 
     1    2    3

»p(1) = q

p =
     4    2    3

»A1 = Ab(:,p)
     %replace 1st column with b

A1 =
     2    2    3
     5    5    6
     7    8    8
```

```matlab
»x1 = det(A1)/det(A)
     %Cramer’s rule

x1 =
     1
```
Go for next component in solution

```matlab
>> p = 1:n;
>> p(2) = q;
>> x2 = det(Ab(:,p))/det(A)
x2 =

    -1
```

Of course, you can use gaussian elimination and get it all with one command as in

```matlab
>> x = A\b
x =

    1.00000000000000
   -1.00000000000000
    1.00000000000000
```
Visualization

Terrain data

»f = [0 3 2 4 0 1 2 3];

»n = length(f)  %Number of data points
n =

8

»t = 1:n;  %Sequence vector

»plot(f)

You see that the graph is scaled so that the data is fills the box.
Issue command to plot with marks and rescale the plot box.

```matlab
»plot(t,f,t,f,'o') %Plot an overlay
»title('Terrain Data') %Add title and
»xlabel('Position') %label
»ylabel('Elevation')
»axis([0 8 0 5]) % See help axis
```

How was it presented here? I copied commands from the Command Window and pasted them into a ClarisWorks document. Same for figures.