**Matrices and Vectors**

Matrices are 2-dimensional arrays:

|  |
| --- |
|  |

The above matrix has four rows and three columns, so it is a 4 x 3 matrix.

A vector is a matrix with one column and many rows:

|  |
| --- |
|  |

So vectors are a subset of matrices. The above vector is a 4 x 1 matrix.

**Notation and terms**:

* A*ij* refers to the element in the i-th row and j-th column of matrix A.
* A vector with 'n' rows is referred to as an 'n'-dimensional vector.
* *vi* refers to the element in the i-th row of the vector.
* In general, all our vectors and matrices will be 1-indexed. Note that for some programming languages, the arrays are 0-indexed.
* Matrices are usually denoted by uppercase names while vectors are lowercase.
* "Scalar" means that an object is a single value, not a vector or matrix.
* R refers to the set of scalar real numbers.
* Rn refers to the set of n-dimensional vectors of real numbers.

Run the cell below to get familiar with the commands in Octave/Matlab. Feel free to create matrices and vectors and try out different things.

|  |
| --- |
| % The ; denotes we are going back to a new row.  A = [1, 2, 3; 4, 5, 6; 7, 8, 9; 10, 11, 12]  % Initialize a vector  v = [1;2;3]  % Get the dimension of the matrix A where m = rows and n = columns  [m,n] = size(A)  % You could also store it this way  dim\_A = size(A)  % Get the dimension of the vector v  dim\_v = size(v)  % Now let's index into the 2nd row 3rd column of matrix A  A\_23 = A(2,3) |

Processing

A =

1 2 3

4 5 6

7 8 9

10 11 12

v =

1

2

3

m = 4

n = 3

dim\_A =

4 3

dim\_v =

3 1

A\_23 = 6