

MATH 230 - Lecture 20 (03/24/2011)

Iterations in MATLAB

e.g., adding 2 vectors. $\bar{a} = \begin{bmatrix} a_1 \\ a_2 \\ \vdots \\ a_n \end{bmatrix}$, $\bar{b} = \begin{bmatrix} b_1 \\ \vdots \\ b_n \end{bmatrix}$. To find

$\bar{c} = \bar{a} + \bar{b}$, we can write a **for** loop.

```
for i=1 to n
     $\bar{c}(i) = \bar{a}(i) + \bar{b}(i)$ 
end
```

To square every entry in $A \in \mathbb{R}^{m \times n}$.

With $A = [a_{ij}]$, we want $a_{ij} \leftarrow a_{ij}^2$
 replace.

```
for i=1 to m → for each row
    for j=1 to n
         $a_{ij} \leftarrow a_{ij}^2$ 
    end
end
```

→ doing it row-wise

Could also do

```
for j=1 to n → for each column
    for i=1 to m
         $a_{ij} \leftarrow a_{ij}^2$ 
    end
end
```

column-wise addition

Functions in MATLAB

A "black-box" which takes some input and gives some output. For instance, we can write a function that takes as input two vectors \bar{a}, \bar{b} and outputs their sum \bar{c} , i.e., $\bar{c} = \bar{a} + \bar{b}$.

```

function  $\bar{c} = \text{Sum}(\bar{a}, \bar{b})$ 
     $n = \text{length}(\bar{a});$ 
     $\bar{c} = \text{zeros}(n, 1);$ 
    for  $i = 1$  to  $n$ 
         $c(i) \leftarrow a(i) + b(i);$ 
    end
  
```

output

inputs assuming $\bar{a}, \bar{b} \in \mathbb{R}^{n \times 1}$
Column vectors.

Save all the commands as the file Sum.m

The word **sum** is a keyword in MATLAB already. You do not want reuse preset keywords. MATLAB usually complains if you try to do so.

See MATLAB output on course webpage!