

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.

$\left\{ \begin{array}{l} \text{for } i=1 \text{ to } m \xrightarrow{\text{for each row}} \\ \quad \text{for } j=1 \text{ to } n \\ \quad \quad a_{ij} \leftarrow a_{ij}^2 \\ \quad \text{end} \end{array} \right.$

} doing it row-wise

Could also do

$\left\{ \begin{array}{l} \text{for } j=1 \text{ to } n \xrightarrow{\text{for each column}} \\ \quad \text{for } i=1 \text{ to } m \\ \quad \quad a_{ij} \leftarrow a_{ij}^2 \\ \quad \text{end} \end{array} \right.$
} 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 $\bar{c} = \text{Sum}(\bar{a}, \bar{b})$
 output
 inputs assuming $\bar{a}, \bar{b} \in \mathbb{R}^{n \times 1}$
 Column vectors.
 $n = \text{length}(\bar{a});$
 $\bar{c} = \text{zeros}(n, 1);$

```

for i=1 to n
    c(i) ← a(i)+b(i);
end
    
```

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!