

INTRODUCTION TO MATLAB

Vectors and matrices

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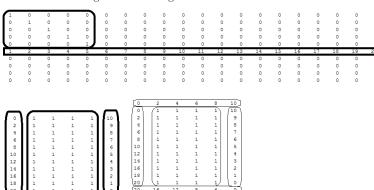
Dresden, 6. November 2014

01 Review of previous session

- Concatenating vectors
- Defining matrices
- Transpose of matrices
- Matrix indexing
- Wildcard:
- Operations between scalars, vectors and matrices

02 Exercises with matrices

Create the following matrices using one line of code:



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02 Matrix multiplication

For two matrices $A_{n\times m}$ and $B_{m\times l}$,

Then C = A * B is of size $n \times l$

The number of columns of A must be the same as the number of rows in B. For example:

$$\mathbf{A} * \mathbf{B} = \left(\begin{array}{cc} 0 & 0 \\ 0 & 0 \\ 0 & 0 \end{array} \right)$$

 $size(A) = 3 \times 4$, $size(B) = 4 \times 2$, $size(A*B) = 3 \times 2$

Try the command: size(ones(3,4)*zeros(4,2))

02 Exersamples

- Create the matrix MatI = eye(4)
- Create a matrix MatB with columns of MatA such that you can do MatB*MatI
- Add rows to MatA so that you can multiply MatI*MatA. The new rows must follow the pattern in MatA
- Create the vector VecA with the second row of MatA. Then delete the values 20 and 90 from it by assigning them to the empty vector "[]".
- Delete the extra rows created in MatA by assigning an empty vector
 "[]" to these rows.
- **6** Select the appropriate operations that are possible: $A \square A' \square eye(3) =$

03 Operations

Matrix times matrix:

$$A = \begin{pmatrix} a & b \\ c & d \end{pmatrix} B = \begin{pmatrix} w & x \\ y & z \end{pmatrix}$$

$$A. *B = \begin{pmatrix} aw & bx \\ cy & dz \end{pmatrix} \neq A *B$$

$$A./B = \begin{pmatrix} a/w & b/x \\ c/y & d/z \end{pmatrix} \neq A/B$$

$$A. \pm B = A \pm B = \begin{pmatrix} a \pm w & b \pm x \\ c \pm y & d \pm z \end{pmatrix}$$

$$A. ^2 = \begin{pmatrix} a^2 & b^2 \\ c^2 & d^2 \end{pmatrix} \neq A ^2$$

Note: the sizes of the two matrices in elementwise operations must be exactly the same.

03 Exceptions

- 2+ones(2,3)
- 2*ones(2,3)
- 2./ones(2,3)
- 2.^ones(2,3)

03 Exercises

• Compute
$$S(N) = \sum_{n=1}^{N} \frac{1}{n} = 1 + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{N}$$
, for $N = 100$

Ompute
$$G(N) = \sum_{n=1}^{N} x^n = x + x^2 + x^3 + \dots + x^N, x = 0.5$$
, for $N = 100$