Matlab Indexing Cheat Sheet

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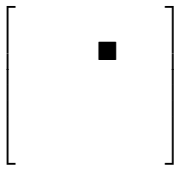
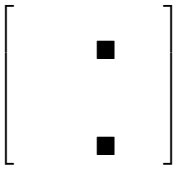
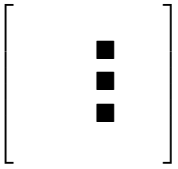
Matrix Indexing

1. Matlab uses (row,column) subscripts to label matrices: $\begin{bmatrix} \texttt{A}(1,1) & \texttt{A}(1,2) & \texttt{A}(1,3) & \texttt{A}(1,4) \\ \texttt{A}(2,1) & \texttt{A}(2,2) & \texttt{A}(2,3) & \texttt{A}(2,4) \\ \texttt{A}(3,1) & \texttt{A}(3,2) & \texttt{A}(3,3) & \texttt{A}(3,4) \\ \texttt{A}(4,1) & \texttt{A}(4,2) & \texttt{A}(4,3) & \texttt{A}(4,4) \end{bmatrix}$

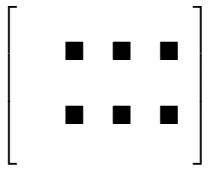
2. Matlab numbers down each column in turn: $\begin{bmatrix} \texttt{A}(1) & \texttt{A}(5) & \texttt{A}(9) & \texttt{A}(13) \\ \texttt{A}(2) & \texttt{A}(6) & \texttt{A}(10) & \texttt{A}(14) \\ \texttt{A}(3) & \texttt{A}(7) & \texttt{A}(11) & \texttt{A}(15) \\ \texttt{A}(4) & \texttt{A}(8) & \texttt{A}(12) & \texttt{A}(16) \end{bmatrix}$

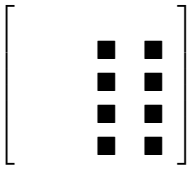
3. Get a single element: `A(2,3)` $\simeq$ 

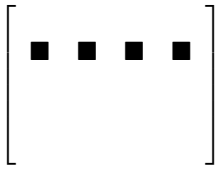
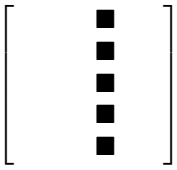
4. Multiple elements: `A([2 5],3)` $\simeq$ 

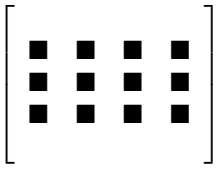
5. Get subrows and subcolumns: `A(2:4,3)` $\simeq$  ,

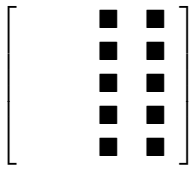
`A(2,1:2)` $\simeq$ 

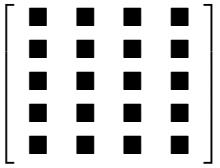
6. Disconnected subrows: `A([2 4],2:4)` $\simeq$ 

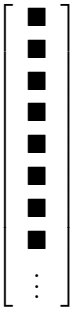
7. Get sub-blocks: `A(2:5,3:4)` $\simeq$ 

8. Get single row, column: `A(2,:)` $\simeq$  , `A(:,3)` $\simeq$ 

9. Multiple rows, columns: `A(2:4,:)` $\simeq$  , `A(:,3:4)` $\simeq$



10. Whole matrix: `A(:,:)` $\simeq$ 

11. Entire array (as column vector): `A(:)` $\simeq$ 

Logical Indexing

1. For logical indexing, if `L` is a logical vector with the same dimensions as `A`, you can always treat `L` as being equivalent to the indices returned by `find(L)`:

$$[0\ 1\ 0\ 1\ 1\ ] \simeq [2\ 4\ 5]$$

2. This means that we can replace any expression involving logical indices by the expression involving regular indices:

$$\mathtt{A}(\mathtt{L},\mathtt{M}) \simeq \mathtt{A}(\mathtt{find}(\mathtt{L}),\mathtt{find}(\mathtt{M}))$$

3. **Example:** Let `L=[0 1 0 1 1]` and `M = [0 1 0 1]`. What is `A(L,M)`?

   From 1, we have

$$\begin{aligned} \mathtt{L} &\simeq [2\ 4\ 5] \\ \mathtt{M} &\simeq [2\ 4] \end{aligned}$$

   so

$$\mathtt{A}(\mathtt{L},\mathtt{M}) \simeq \mathtt{A}([2\ 4\ 5],[2\ 4]) \simeq \begin{bmatrix} & \blacksquare & \blacksquare \\ & & \\ & \blacksquare & \blacksquare \\ & \blacksquare & \blacksquare \end{bmatrix}.$$