Matrices basics

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \end{bmatrix}$$ 2 rows, 3 columns

In MATLAB:

```
A = [1 2 3; 4, 5, 6]
```

- Define by rows
- Can use either space ' ' or comma ',' to divide btw elements in a row
- Use semicolon ';' to divide btw rows.

```
size(A)
ans =
     2     3
```

2 rows, 3 cols

Combining matrices:

```
B = A
[A, B]   % or [A B]
ans =
     1     2     3     1     2     3
     4     5     6     4     5     6
[A; B]
ans =
     1     2     3
     4     5     6
     1     2     3
     4     5     6
```

Refer to one element in a matrix:

① Specify one number. Go by cols!!

```
A(3)
ans =
     2
```

$$\begin{bmatrix} 1^{①} & 2^{③} & 3^{⑤} \\ 4^{②} & 5^{④} & 6^{⑥} \end{bmatrix}$$

② Specify 2 numbers. row, col

```
A(2,1)
ans =
     4
```

Multiple elements:

- 2:4 means from 2 to 4 i.e 2, 3, 4. col1 col2 cols

```
A(1, 1:2)   % 1st row, 1 to 2 col.
ans =
     1     2
```

$$\begin{bmatrix} \underbrace{1 \quad 2}_{r1} & 3 \\ 4 & 5 \quad 6 \end{bmatrix} \begin{matrix} \\ r2 \end{matrix}$$

- : means "all".

```
A(:, 2)   % all rows, 2nd col
ans =
     2
     5
```

$$\begin{bmatrix} 1 & \overbrace{2}^{} & 3 \\ 4 & 5 & 6 \end{bmatrix}$$

Matrix inverse:

① $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$, solve for a, b, c, d.

② Gauss elimination: (Not in this course)

$$\begin{bmatrix} 1 & 2 & 1 & 0 \\ 3 & 4 & 0 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 2 & 1 & 0 \\ 0 & -2 & -3 & 1 \end{bmatrix}$$

③ inv(A)

$$\rightarrow \begin{bmatrix} 1 & 0 & -2 & 1 \\ 0 & -2 & -3 & 1 \end{bmatrix} \rightarrow \begin{bmatrix} 1 & 0 & -2 & 1 \\ 0 & 1 & \frac{3}{2} & -\frac{1}{2} \end{bmatrix}$$

A^{-1}