Motivation

Have you seen some Linear Algebra in earlier classes? Yes!

Solve $\begin{cases} x + 2y - z = 3 \\ x - 3y + z = 2 \\ 2x - y - z = 3 \end{cases}$

Write $\begin{cases} x + 2y - z = 3 \\ x - 3y + z = 2 \\ 2x - y - z = 3 \end{cases}$ using matrices and vectors and solve the problem again with an "augmented" matrix.

Solve Ax=b where

```
A=[1 2 -1; 1 -3 1; 2 -1 -1] , b = [3 2 3]'
```

```
A = 3×3
     1     2    -1
     1    -3     1
     2    -1    -1
b = 3×1
     3
     2
     3
```

```
x=A\b
```

```
x = 3×1
     3
     1
     2
```

If we add a column for another variable to this system, we would have a general solution consisting of an infinite amount of solutions. MatLab uses projection (chapter 4) to give just one solution.

```
c=[1 1 1]' , K=[A c] , y=K\b
```

```
c = 3×1
     1
     1
     1
K = 3×4
     1     2    -1     1
     1    -3     1     1
     2    -1    -1     1
y = 4×1
    3.0000
    1.0000
    2.0000
         0
```

Why are there decimals in this answer, but not the first one? (3, 1, 2, 0) is also a solution of the next system, but the program gives a different answer:

```
P=[A b], m = P\b
```

```
P = 3×4
     1     2    -1     3
     1    -3     1     2
     2    -1    -1     3
m = 4×1
         0
   -0.0000
   -0.0000
    1.0000
```