I WILL BE IN LAB TONIGHT @ 5 pm UNTIL 6:30 OR NO ONE ELSE THERE...

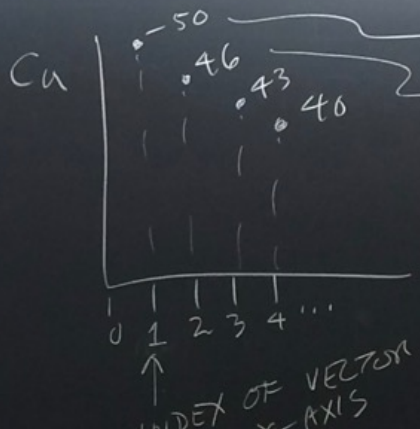
DATA → CONC.

d = [...];

% EXTRACT Ca DATA

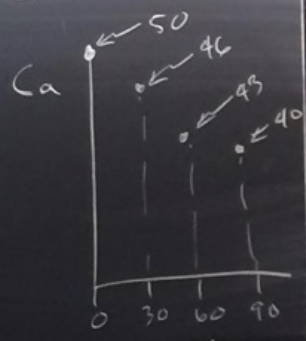
Ca = d(:, 3);

plot(Ca)



plot(Ca)

→ WANT

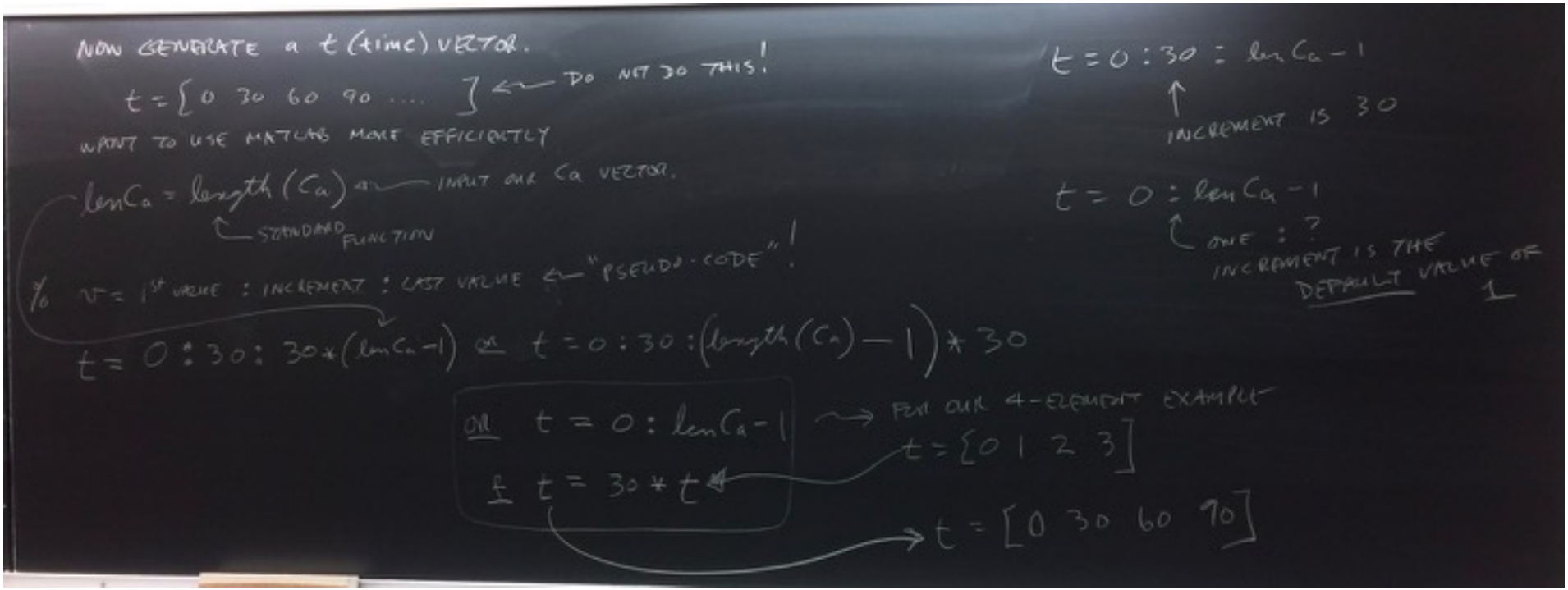


plot(t, Ca)

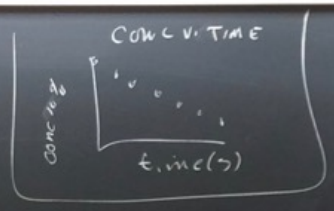
X-AXIS VECTOR

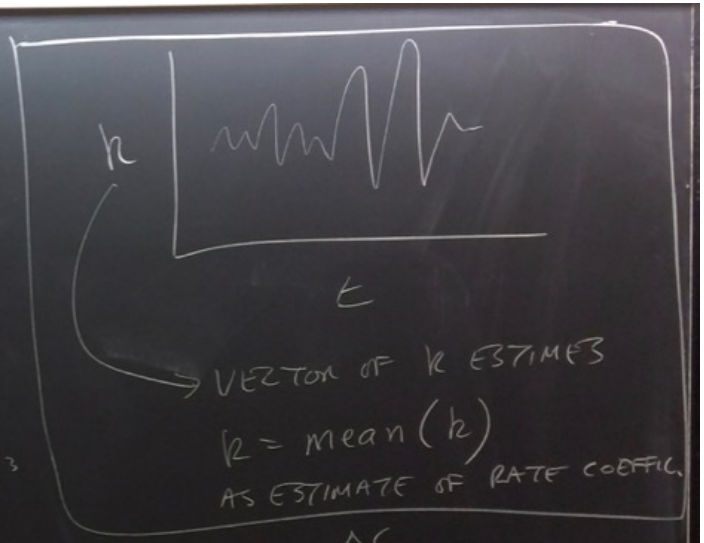
Y-AXIS VECTOR

MUST BE OF EQUAL LENGTH


NOW GENERATE a t (time) VECTOR.
t = [0 30 60 90 ...] ← DO NOT DO THIS!
WANT TO USE MATLAB MORE EFFICIENTLY
lenCa = length (Ca) ← INPUT OUR Ca VECTOR.
↑ STANDARD FUNCTION
% v = 1st VALUE : INCREMENT : LAST VALUE ← "PSEUDO-CODE"!
t = 0 : 30 : 30 * (lenCa - 1) OR t = 0 : 30 : (length (Ca) - 1) * 30
OR t = 0 : lenCa - 1
t = 30 * t
FOR OUR 4-ELEMENT EXAMPLE
t = [0 1 2 3]
t = [0 30 60 90]
t = 0 : 30 : lenCa - 1
↑ INCREMENT IS 30
t = 0 : lenCa - 1
↑ ONE : ?
INCREMENT IS THE DEFAULT VALUE OF 1

```
plot(t, Ca)
title('conc vs. time')
ylabel('conc in %')
xlabel('time (s)')
```





→ VECTOR OF k ESTIMES

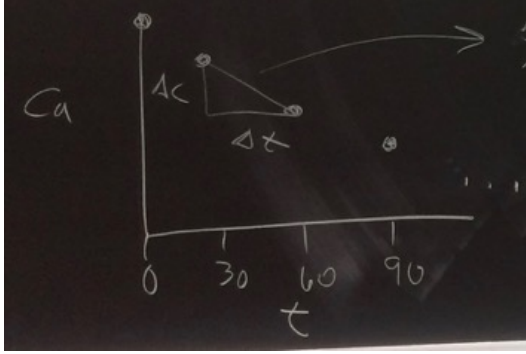
k = mean(k)

AS ESTIMATE OF RATE COEFFIC.

% Ca VALUES NOW IN % OF RANGE 0-2 mol/m3

% CONVERT TO mol/m3

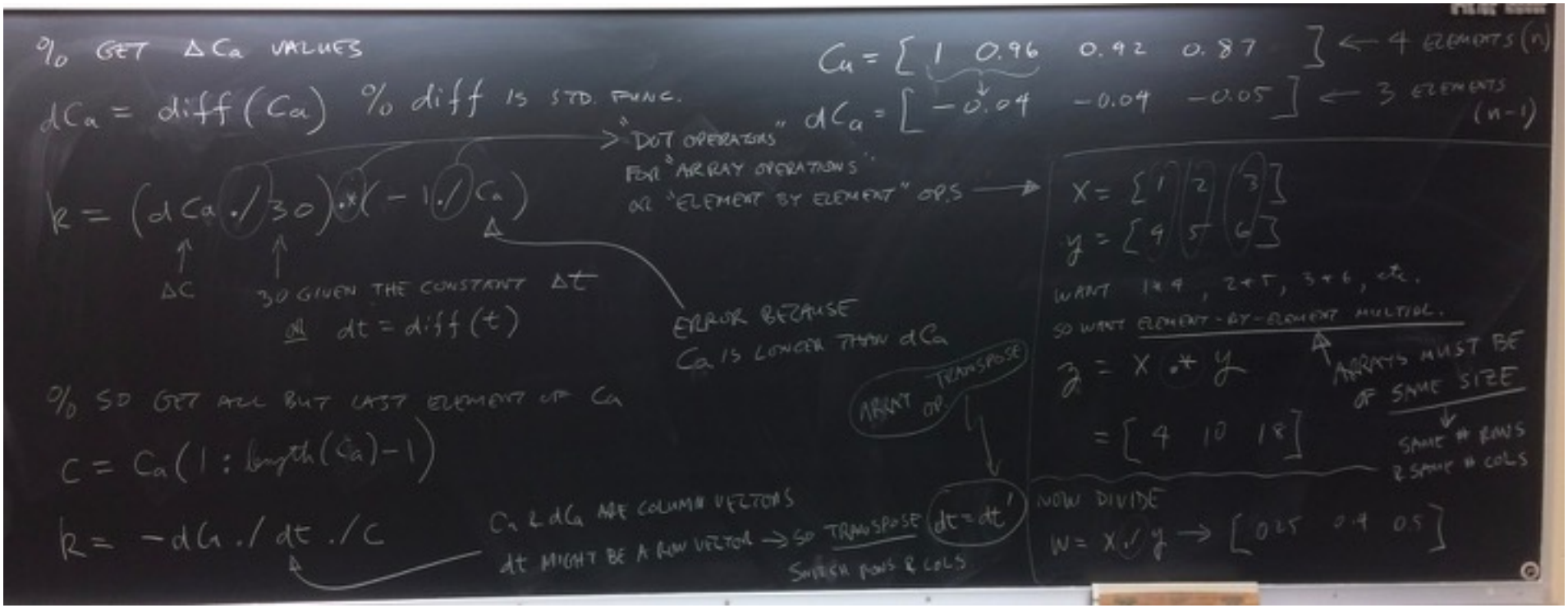
Ca = Ca/100 * 2 % e.g. 50/100 * 2 = 1 mol/m3



$\frac{\Delta C}{\Delta t}$ IN LIMIT AS $\Delta t \to 0$ $= \frac{dC}{dt}$ ← WE USE THE DIFFERENCES $\frac{\Delta C}{\Delta t}$

AS AN APPROXIMATION TO DERIVATIVE $\frac{dC}{dt}$

WANT TO ESTIMATE $k = \left(\frac{dC}{dt}\right)\left(-\frac{1}{Ca}\right) \Leftarrow \frac{dCa}{dt} = -kCa$


% GET ΔCa VALUES
dCa = diff(Ca) % diff IS STD. FUNC.
Ca = [1 0.96 0.92 0.87] ← 4 ELEMENTS (n)
dCa = [-0.04 -0.04 -0.05] ← 3 ELEMENTS (n-1)
"DOT OPERATORS" FOR "ARRAY OPERATIONS" OR "ELEMENT BY ELEMENT" OPS
k = (dCa ./ 30) .* (-1 ./ Ca)
ΔC
30 GIVEN THE CONSTANT Δt
OR dt = diff(t)
ERROR BECAUSE Ca IS LONGER THAN dCa
% SO GET ALL BUT LAST ELEMENT OF Ca
c = Ca(1 : length(Ca)-1)
k = -dCa ./ dt ./ c
Ca & dCa ARE COLUMN VECTORS
dt MIGHT BE A ROW VECTOR → SO TRANSPOSE
SWITCH ROWS & COLS
dt = dt'
WANT TRANSPOSE OF
X = [1 2 3]
y = [4 5 6]
WANT 1*4, 2*5, 3*6, etc.
SO WANT ELEMENT-BY-ELEMENT MULTIPL.
z = X .* y
= [4 10 18]
ARRAYS MUST BE OF SAME SIZE
SAME # ROWS & SAME # COLS
NOW DIVIDE
W = X ./ y → [0.25 0.4 0.5]

OPERATIONS ON ARRAYS IN MATLAB WITH NON-DOT OPERATORS

`X * y` ← MATRIX MULTIPLICATION

A LINEAR ALGEBRA PROBLEM

`X / y` ← MATRIX DIVISION

WITH SCALAR VALUES

SAME RESULT WITH OR WITHOUT DOTS