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### 3.4.2 Via AXPY Operations

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Week 3 due Oct 18, 2023 06:12 IST

# 3.4.2 Via AXPY Operations



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▶ 2.0x

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**Errata:** About 2 minutes into the tape, I make a mistake... See if you can find it!

**Juan found it! (see image below)**

Example

$$A \cdot x = x_0 a_0 + x_1 a_1 + x_2 a_2$$
$$\begin{pmatrix} -1 & 0 & 2 \\ 2 & -1 & 1 \\ 3 & 1 & -1 \end{pmatrix} \begin{pmatrix} -1 \\ 2 \\ 1 \end{pmatrix} = (-1) \begin{pmatrix} -1 \\ 2 \\ 7 \end{pmatrix} + 2 \begin{pmatrix} 0 \\ -1 \\ 1 \end{pmatrix} + 1 \begin{pmatrix} -1 \\ 2 \\ 1 \end{pmatrix}$$
$$= \begin{pmatrix} 1 \\ -2 \\ -7 \end{pmatrix} + \begin{pmatrix} 0 \\ -2 \\ 2 \end{pmatrix} + \begin{pmatrix} -1 \\ 2 \\ 1 \end{pmatrix}$$
$$= \begin{pmatrix} 0 \\ -4 \\ -6 \end{pmatrix}$$

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▶ 1:46 / 6:53

▶ SPEED 1.0x

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# Reading Assignment

0 points possible (ungraded)  
Read Unit 3.4.2 of the notes. [\[LINK\]](#)

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## Discussion

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?

Solutions

Hi, Where can I find the solution to the homework algorithm?

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## Homework 3.4.2.1

1/1 point (graded)  
Implement the function

function [ y\_out ] = Mvmult\_n\_unb\_var2( A, x, y )

that corresponds to the algorithm

Algorithm:  $y := \text{MVMULT\_N\_UNB\_VAR2}(A, x, y)$

Partition  $A \rightarrow (A_L | A_R), x \rightarrow \begin{pmatrix} x_T \\ x_B \end{pmatrix}$

where  $A_L$  is  $m \times 0$  and  $x_T$  is  $0 \times 1$

while  $m(x_T) < m(x)$  do

Repartition

$(A_L | A_R) \rightarrow (A_0 | a_1 | A_2), \begin{pmatrix} x_T \\ x_B \end{pmatrix} \rightarrow \begin{pmatrix} x_0 \\ \chi_1 \\ x_2 \end{pmatrix}$

where  $a_1$  is a column

---

 $y := \chi_1 a_1 + y$ 

---

Continue with

$(A_L | A_R) \leftarrow (A_0 | a_1 | A_2), \begin{pmatrix} x_T \\ x_B \end{pmatrix} \leftarrow \begin{pmatrix} x_0 \\ \chi_1 \\ x_2 \end{pmatrix}$

endwhile

Some links that will come in handy:

- [Spark](#) (alternatively, open the file LAFF-2.0xM/Spark/index.html)
- [PictureFLAME](#) (alternatively, open the file LAFF-2.0xM/PictureFLAME/PictureFLAME.html)

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Answer:

- View a document that we put together that has most algorithms and MATLAB implementations that are homework problems in this week:

Week 3 algorithms and implementations .

This document is best viewed two pages, side by side, so that you can see the algorithm on the left and its implementation on the right.

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