







< Previous	 						Next >
------------	---	---	---	---	---	---	--------

### 3.2.2 The Identity Matrix

 Bookmark this page

Week 3 due Oct 18, 2023 06:12 IST

# 3.2.2 The Identity Matrix



▶ 7:22 / 7:22

▶ 2.0x

🔊

🔍

CC

🗣️

Video

📄 [Download video file](#)

Transcripts

📄 [Download SubRip \(.srt\) file](#)

📄 [Download Text \(.txt\) file](#)

Reading Assignment

0 points possible (ungraded)  
Read Unit 3.2.2 of the notes. [\[LINK\]](#)

☒ Done



Submit

✔ Correct

Discussion

Topic: Week 3 / 3.2.2




Hide Discussion

Add a Post

Show all posts ▼

by recent

🧮 Calculator

 ~6:12 Dictation error	4
 error function set_to_identity(A). code ; _function [ A_out ] = set_to_identity_unb( A ) [ ATL, ATR, ... ABL, ABR ] = FLA_Part_2x2( A, ... 0, 0, 'FLA_TL' ); while ( size( ATL, 1 ) < size( ...	3
 get Error on Matlab I get error on MATLAB after copy from spark on 13 . and still cannot view in Picture FIAME the Identity of Martrix it not show the step to like vid...	2

Homework 3.2.2.1

1/1 point (graded)  
Let  $L_1 : \mathbb{R}^n \rightarrow \mathbb{R}^n$  be the function defined for every  $x \in \mathbb{R}^n$  as  $L_1(x) = x$ .

$L_1$  is a linear transformation.

TRUE

✔ Answer: TRUE

Explanation  
 $L_1(\alpha x) = \alpha x = \alpha L_1(x)$  and

$L_1(x + y) = x + y = L_1(x) + L_1(y).$

Submit

Answers are displayed within the problem

Homework 3.2.2.2

1/1 point (graded)  
With the FLAME@lab API, write a function that sets the entries of a given square matrix to an identity matrix, one column at a time, based on the algorithm

Algorithm:  $[A] := \text{SET\_TO\_IDENTITY}(A)$

**Partition**  $A \rightarrow \left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right)$   
where  $A_{TL}$  is  $0 \times 0$   
**while**  $m(A_{TL}) < m(A)$  **do**

**Repartition**

$\left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \rightarrow \left( \begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$   
where  $\alpha_{11}$  is  $1 \times 1$

---

set current column to appropriate unit basis vector  
 $a_{01} := 0$  set  $a_{01}$ 's components to zero  
 $\alpha_{11} := 1$   
 $a_{21} := 0$  set  $a_{21}$ 's components to zero

---

**Continue with**

$\left( \begin{array}{c|c} A_{TL} & A_{TR} \\ \hline A_{BL} & A_{BR} \end{array} \right) \leftarrow \left( \begin{array}{c|c|c} A_{00} & a_{01} & A_{02} \\ \hline a_{10}^T & \alpha_{11} & a_{12}^T \\ \hline A_{20} & a_{21} & A_{22} \end{array} \right)$

**endwhile**

You will use the functions `laff_zerov( x )` and `laff_onev( x )`, which respectively return a zero vector and a vector of all ones of the same size and shape (column or row) as input vector `x`. Check if these routines are in directory

 Calculator

If not, download them into that directory from

- [laff\\_zerov.m](#)
- [laff\\_onev.m](#)

and place them in that directory, in files `laff_zerov.m` and `laff_onev.m`. Since this is the first time that you will "move" through a matrix from top-left to bottom-right (TL→BR), you will want to follow the instructions in the video below this homework.

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`)

You will need these in many future exercises. Bookmark them!

☒ Done/Skip



Answer:

- See below video
- 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.

Submit

**i** Answers are displayed within the problem

On the slide used in video 3.2.2, around timestamp 3:12, that there's a couple little things that should be changed (but won't be because redoing videos is time consuming...):

- Eliminate the phrase *where 0 denotes the zero vector "of appropriate size"*:. As the video and slide are about the identity transformation  $L_I$ , this seems to be irrelevant.
- Next to the first vector, I believe the " $L_0$ " should be " $L_I$ ." Also there's that singular left parenthesis.

A thanks to participant "Zuarrie" for pointing this out.

Timmy Two Space

Picture FLAME

YouTube

Spark

Week3.pdf

S3Fox Organizer

+

file:///Users/rvdg/LAFFSpring2015/PictureFLAME/PictureFLAME.html

Search

Most Visited

SDS 329C (5 unre...

hourly

Facebook

3PLAY

FTP

Spark

Canvas

mailchimp

YouTube

edx

Studio

cPanel X

edX - Media Deliv...

PictureFLAME

Animation

Next

Reload

New Program

Play

Stop

```
[ ATL, ATR, ...
  ABL, ABR ] = FLA_Part_2x2( A, ...
                           0, 0, 'FLA_TL' );

while ( size( ATL, 1 ) < size( A, 1 ) )

    [ A00, a01,    A02, ...
      a10t, alpha11, a12t, ...
      A20, a21,    A22 ] = FLA_Repart_2x2_to_3x3( ATL, ATR, ...
                                                  ABL, ABR, ...
                                                  1, 1, 'FLA_BR' );

    a01 = laff_zerov( a01 );
    alpha11 = laff_onev( alpha11 );
```

A

1	0	0	-4	-5
0	1	0	3	-2
0	0	1	0	-3
3	-5	-5	-1	2
3	4	4	1	2

Calculator

```
a10t = laff_zerov( a10t );

[ ATL, ATR, ...
  ABL, ABR ] = FLA_Cont_with_3x3_to_2x2( A00, a01, A02, ...
                                          a10t, alpha11, a12t, ...
                                          A20, a21, A22, ...
                                          'FLA_TL' );
```

⏏

8:24 / 8:28

▶ 2.0x

🔊

🔍

📄

💬

Video

📄 Download video file

Transcripts

📄 Download SubRip (.srt) file

📄 Download Text (.txt) file

Homework 3.2.2.3

1/1 point (graded)

In the MATLAB Command Window, type

A = eye( 4,4 )

What is the resulting matrix?

- ☐

0 0 0 0 0

0 0 0 0 0

0 0 0 0 0

0 0 0 0 0
- ☐

0 0 0 0

0 0 0 0

0 0 0 0

0 0 0 0

0 0 0 0
- ☒

1 0 0 0

0 1 0 0

0 0 1 0

0 0 0 1
- ☐ None of the above



The result is

```
>> eye( 4, 4)

ans =

    1     0     0     0
    0     1     0     0
    0     0     1     0
    0     0     0     1
```

Submit

### Homework 3.2.2.4


1/1 point (graded)  
Apply the identity matrix to Timmy Two Space. What happens?

- ☐ Timmy shifts off the grid.
- ☐ Timmy disappears into the origin.
- ☐ Timmy becomes a line of the x-axis.
- ☐ Timmy becomes a line of the y-axis.
- ☒ Timmy doesn't change at all.



Explanation  
The identity matrix, when applied to any vector, will not change the original vector at all. This is part of the definition of the identity matrix.

Submit

 Answers are displayed within the problem

### Homework 3.2.2.5

1/1 point (graded)  
The trace of a matrix equals the sum of the diagonal of the matrix. What is the trace of the identity  $I \in \mathbb{R}^{n \times n}$ ?

n

 Answer: n

Explanation  
There are \$ n \$ ones on the diagonal of the identity matrix.

Submit

[< Previous](#)

[Next >](#)



[News](#)

# Legal

- [Terms of Service & Honor Code](#)
- [Privacy Policy](#)
- [Accessibility Policy](#)
- [Trademark Policy](#)
- [Sitemap](#)
- [Cookie Policy](#)
- [Your Privacy Choices](#)

# Connect

- [Idea Hub](#)
- [Contact Us](#)
- [Help Center](#)
- [Security](#)
- [Media Kit](#)



© 2023 edX LLC. All rights reserved.  
深圳市恒宇博科技有限公司 [粤ICP备17044299号-2](#)