

MATLAB assignment 9

Introduction to Linear Algebra (Week 9)

Fall, 2019

1. Let \mathcal{B}_1 and \mathcal{B}_2 be bases for \mathbb{R}^n . Write a function code `TransMatrix` which produces two transition matrices $P_{\mathcal{B}_1 \rightarrow \mathcal{B}_2}$ and $P_{\mathcal{B}_2 \rightarrow \mathcal{B}_1}$ as outputs when it takes two matrices U and V whose column vectors are members of \mathcal{B}_1 and \mathcal{B}_2 , respectively. In other words, if

$$\mathcal{B}_1 := \{\mathbf{u}_1, \dots, \mathbf{u}_n\} \quad \text{and} \quad \mathcal{B}_2 := \{\mathbf{v}_1, \dots, \mathbf{v}_n\}$$

then

$$U = [\mathbf{u}_1 \mid \dots \mid \mathbf{u}_n] \quad \text{and} \quad V = [\mathbf{v}_1 \mid \dots \mid \mathbf{v}_n]$$

and the line defining the function `TransMatrix` is :

```
function [P_B12, P_B21] = TransMatrix(U, V)
```

where the `P_B12` and `P_B21` are variables for transition matrices $P_{\mathcal{B}_1 \rightarrow \mathcal{B}_2}$ and $P_{\mathcal{B}_2 \rightarrow \mathcal{B}_1}$, respectively.

Problem.

- (a) Write script file which finds the transition matrices $P_{\mathcal{B}_1 \rightarrow \mathcal{B}_2}$ and $P_{\mathcal{B}_2 \rightarrow \mathcal{B}_1}$, where the \mathcal{B}_1 and \mathcal{B}_2 are bases for \mathbb{R}^5 and

$$\begin{array}{ll} \mathbf{u}_1 = (3, 1, 3, 2, 6) & \mathbf{v}_1 = (2, 6, 3, 4, 2) \\ \mathbf{u}_2 = (4, 5, 7, 2, 4) & \mathbf{v}_2 = (3, 1, 5, 8, 3) \\ \mathbf{u}_3 = (3, 2, 1, 5, 4) & \mathbf{v}_3 = (5, 1, 2, 6, 7) \\ \mathbf{u}_4 = (2, 9, 1, 4, 4) & \mathbf{v}_4 = (8, 4, 3, 2, 6) \\ \mathbf{u}_5 = (3, 3, 6, 6, 7) & \mathbf{v}_5 = (5, 5, 6, 3, 4). \end{array}$$

Find the coordinate of $\mathbf{w} = (1, 1, 1, 1, 1)$ with respect to \mathcal{B}_1 and \mathcal{B}_2 and check your answers using $P_{\mathcal{B}_1 \rightarrow \mathcal{B}_2}$ and $P_{\mathcal{B}_2 \rightarrow \mathcal{B}_1}$.

[You may need to refer guide code uploaded onto the KLMS.]

2. Read the attachment ‘MATLAB_Week9.pdf’ and practice by yourself.

There is **nothing** to submit in this assignment.

Study and practice by yourself, and please try to make a lot of questions.

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