

A2 2.mid-term – 2020.05.13.

The student acknowledges that he / she has not used a prohibited tool while writing the midterm!

Meaning of letters in the questions:

	Neptun code	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
F	First letter	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
L	Last letter	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	4	4	4	4	4	4

Questions:

1. Determine the rank of the following matrix:

$$\begin{bmatrix} 1 & 2 & 0 & F \\ 2 & 4 & 0 & L-1 \\ 0 & 0 & -1 & 1 \\ 0 & 0 & 1 & -F \end{bmatrix}$$

2. Give the matrix of the following spatial transformation: rotation around x axis by $L \cdot 30^\circ$ after reflection in the line $x = Fy + (1 - F)z$.
3. Determine the eigenvalues and eigenvectors of the following matrix:

$$\begin{bmatrix} F - L + 1 & 2F + L & F - L - 1 \\ 2F + L & 4F - L & 2F + L \\ F - L - 1 & 2F + L & F - L + 1 \end{bmatrix}$$

4. Diagonalize and determine the 5th power of the matrix in the previous question.

All question worth 5 points. You need reach at least 6 points to pass.