

Linear Algebra. Test 1. Variant 1.

First name	Last name	Group	Points#1
		BS1-	

I am, _____ (initials), confirming that I have read the following rules and agree to comply with them, that all solutions on this paper is my own work.

_____ (signature)

Rules:

- no talking AT ALL is allowed during the exam and after it (if you are still in the room)
- you can use 1 sheet of A4 paper with formulas on both sides
- any electronic devices are not allowed except for a simple non-programmable calculator
- when time is up, you have to put down your pen (pencil) and do NOT write anything else
- you can NOT leave your seat till the end of the test

1. The 4x4 matrix A reduces to the identity matrix I by the following four row operations:

- E_{21} : subtract row 1 from row 2;
- E_{31} : add 2*row 1 to row 3;
- E_{32} : subtract 3*row 2 from row 3;
- E_{41} : subtract 2*row 1 from row 4;
- E_{43} : add row 3 to row 4;

Write and compute A^{-1} (3 points) and A (2 points).

First name	Last name	Group	Points#2
		BS1-	

2. Consider matrix A

$$A = \begin{bmatrix} 1 & 1 & 0 \\ 1 & 6 & -3 \\ 0 & -3 & 2 \end{bmatrix}$$

- Find the factorization $A = LDU$ (3 points)
- Find A inverse (2 points).

First name	Last name	Group	Points#3
		BS1-	

3. Consider matrix A

$$A = \begin{bmatrix} 1 & 1 & 4 & 2 \\ 2 & 1 & 6 & 3 \\ 0 & 1 & 2 & 1 \\ 1 & 0 & 2 & 1 \end{bmatrix} \quad b = \begin{bmatrix} b_1 \\ b_2 \\ b_3 \\ b_4 \end{bmatrix}$$

- Reduce the matrix A to its ordinary Echelon form U (1 point).
- Find a solution for each free variable and describe every solution to $Ax = 0$ (1 point).
- For which nontrivial right-hand sides (find a condition on b_1, b_2, b_3, b_4) $Ax = b$ is solvable (1 point)?
- Provide an example of vector $b \neq 0$ that makes this system solvable (1 point).
- Find the complete solution for $Ax = b$ using b from previous part (3.d) (1 point).