

Mathematics 2023/24, Homework 2
bonus: 2 points, deadline: November 10, 2023

1. Write the definition of the inverse matrix.

2. Let

$$A = \begin{pmatrix} 1 & 3 & 2 \\ 2 & 5 & 3 \\ 1 & 2 & 1 \end{pmatrix}.$$

- (a) Evaluate the determinant of A .
- (b) Using the value of $\det A$ answer the following questions:
 - (i) Are the rows of A linearly dependent or independent?
 - (ii) Determine rank A .
 - (iii) Does the inverse matrix A^{-1} exist?

3. Let

$$B = \begin{pmatrix} 1 & 3 & 2 \\ 1 & 2 & 1 \\ 0 & 1 & 0 \end{pmatrix}.$$

- (a) Evaluate the determinant of B .
- (b) Using the value of $\det B$ answer the following questions:
 - (i) Are the rows of B linearly dependent or independent?
 - (ii) Determine rank B .
 - (iii) Does the inverse matrix B^{-1} exist?

4. Consider the system of equations

$$x_1 + x_2 + 2x_3 = 4$$

$$x_1 + 3x_2 + x_3 = 5$$

$$x_1 + 5x_2 - x_3 = 3$$

- (a) Write the above system in the form $A\vec{x} = \vec{b}$, where A is the coefficient matrix, \vec{x} is the vector of unknowns and \vec{b} is the vector of the right-hand sides.
- (b) Solve the system.

Instructions for writing homework:

- Write your homework with solution (not only the results).
- Take a photo of the homework and convert the picture to PDF (use <https://tools.pdf24.org/en/jpg-to-pdf>).
- Compress the file if it is large (use <https://tools.pdf24.org/en/compress-pdf>).
- Send the final PDF file to the teacher (either chat in MS Teams or e-mail: fisnarov@mendelu.cz).