

Mathematics 2 (Economics, Markets and Finance)

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Exercises sheet 4

Exercise 1. *Compute, if possible, the inverse of the matrix*

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

Exercise 2. *Compute, if possible, the inverse of the matrix*

$$A = \begin{pmatrix} 2 & 1 & 0 & 0 \\ 3 & 2 & 0 & 0 \\ 1 & 1 & 3 & 4 \\ 2 & -1 & 2 & 3 \end{pmatrix}.$$

Exercise 3. *Given the matrices*

$$A = \begin{pmatrix} 1 & 3 \\ 2 & 5 \end{pmatrix}, \quad B = \begin{pmatrix} -2 & 7 \\ 1 & -3 \end{pmatrix},$$

compute A^{-1} , B^{-1} , $C = AB$, C^{-1} . Prove that, for these matrices,

$$C^{-1} = B^{-1}A^{-1}.$$

Exercise 4. *Compute the rank of the matrix*

$$D = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 5 & 3 & 0 & 1 \\ 7 & 7 & 6 & 9 \end{pmatrix}.$$

Exercise 5. *Compute the rank of the matrix*

$$A = \begin{pmatrix} 1 & -2 & -1 & 3 \\ 2 & -4 & -2 & 6 \\ 3 & -6 & -3 & 9 \end{pmatrix}.$$

Exercise 6. Solve the following system both using Cramer's rule and the inverse matrix method.

$$\begin{cases} 3x + 2y + z = 5 \\ 2x + 3y + z = 1 \\ 2x + y + 3z = 11 \end{cases} .$$

Exercise 7. Solve the following system both using Cramer's rule and the inverse matrix method.

$$\begin{cases} 3x + 2y + z = 5 \\ 2x + 3y + z = 1 \\ 2x + y + 3z = 11 \end{cases} .$$

Exercise 8. Solve the following system both using Cramer's rule and the inverse matrix method.

$$\begin{cases} 2x - y - 4z = 3 \\ -x + 3y + z = -10 \\ 3x + 2y - 2z = -2 \end{cases} .$$

Exercise 9. For the following system find the rank both of the coefficients matrix and the augmented matrix.

$$\begin{cases} x + 3y - z = 1 \\ 2x - y + 3z = 5 \end{cases} .$$

Exercise 10. For the following system find the rank both of the coefficients matrix and the augmented matrix.

$$\begin{cases} 2x - 2y + 3z - t = 2 \\ 4x - 4y - z - 2t = 3 \end{cases} .$$

Exercise 11. For the following system find the rank both of the coefficients matrix and the augmented matrix.

$$\begin{cases} 2x + y - z = 3 \\ 5x + 13y - 10z = 6 \\ x - 3y + 2z = 2 \end{cases} .$$

Exercise 12. For the following system find the rank both of the coefficients matrix and the augmented matrix.

$$\begin{cases} x - y + 2z = -1 \\ 2x + y - z = -3 \\ x - 4y + 7z = 2 \end{cases} .$$

Exercise 13. For the following system find the rank both of the coefficients matrix and the augmented matrix.

$$\begin{cases} 2x + y = 13 \\ x - 2y = -11 \\ 3x - y = 2 \\ 4x - 3y = -9 \end{cases} .$$