Matrix Calculations

Assignment 1, Monday, November 7, 2022

Exercise teachers: Recall the following split-up of students:

teacher	**session**	**email**	**lecture room**
Polina Moroza	early morning	polina.moroza@ru.nl	HG02.032
Stefan Popa	early morning	stefan.popa@ru.nl	HG02.052
Lisa Aalbrecht	early morning	lisa.aalbrecht@ru.nl	HG02.054
George-Nicolas Nãdejde	early morning	george-nicolas.nadejde@ru.nl	HG03.085
Robin Foekens	late morning	robin.foekens@ru.nl	Transitorium 00.005
Martan van der Straaten	late morning	martan.vanderstraaten@ru.nl	HG00.065
Mark Boute	late morning	mark.boute@ru.nl	HG00.310
Kevin van de Glind	late morning	kevin.vandeglind@ru.nl	HG02.028
Widad Majdoubi	late morning	widad.majdoubi@ru.nl	HG02.032
Sophie Groenendaal	late morning	sophie.groenendaal@ru.nl	HG02.052

Handing in your answers:

- You can hand in your solutions as **a single PDF** via the assignment module in Brightspace.
- You may submit hand-written or (preferably) LaTeX typeset solutions. In the former case, photos are **not** allowed: use a scanner or a reasonable scan app for your smart phone.
- Make sure that your name, student number, and name of your TA are on top of the first page!
- If agreed with your TA, you are allowed to hand in your solutions on paper.
- Unreadable solutions will **not** be graded.

Your exercise teacher may grade digitally in Brightspace, in which case he/she will leave feedback there, or grade on paper, in which case he/she will drop your graded assignments in the return boxes that are located in the Mercator 1 building on the ground floor.

Deadline: Friday, November 11, 23.59 sharp!

Goals: After completing these exercises successfully you should be able to solve simple systems of equations and to perform Gauss elimination.

Task: For each system of equations of questions 1, 2 and 3: (a) write down the coefficient matrix, (b) write the augmented matrix, (c) transform the matrix into Echelon form, and (d) give at least one solution. Explain briefly how you proceeded.

1. **(5 points)**

$$\begin{aligned} 2x + 5y &= 7 \\ -x + 4y &= 3 \end{aligned}$$

2. **(5 points)**

$$\begin{aligned} x - 5y + 3z &= 7 \\ 3x - 6z &= -9 \\ 5x + y &= -6 \end{aligned}$$

3. **(5 points)**

$$\begin{aligned} x + 7y - 5z + 2t &= 8 \\ 2x + 6y + 6z - 4t &= -8 \\ -x - 7y - z - 2t &= 4 \\ 5x + 2y + 4z - 3t &= -5 \end{aligned}$$

4. **(5 points)** Consider the following system of equations.

$$\begin{aligned} 3x - 9y &= -12 \\ 2x - 5y + Az &= 7 \\ Ay + z &= A \end{aligned}$$

   (a) For which value(s) of A is the system *non-solvable*?

   (b) For which value(s) of A is the system *solvable*?

   (Hint: perform Gaussian elimination first, *before* drawing any conclusions about values for A.)