# Matrix Calculations

**Assignment 1, Tuesday, Feb. 2, 2016**

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

| teacher | lecture room | email |
|---|---|---|
| Abdullahi Ali | HG00.310 | abdullahi154@gmail.com |
| Michiel de Bondt | HG00.308 | debondt@math.ru.nl |
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All (blue) delivery boxes are located in the Mercator building on the ground floor where computing science is located.

**Handing in your answers:** There are two options, *depending on your exercise class teacher*:

1. Delivery box (default): Put your solutions in the appropriate delivery box. Before putting your solutions in the box make sure:
   - your name and student number are written clearly on the document.
2. E-mail (in case your exercise class teacher agrees): Send your solutions by e-mail to your exercise class teacher (see above) with subject '*assignment 1*'. This e-mail should only contain a single PDF document as attachment. Before sending an e-mail make sure:
   - the file is a PDF document that is well readable
   - your name is part of the filename (for example MyName_assignment-1.pdf)
   - your name and student number are included in the document (since they may be printed).

**Deadline: Friday, February 12, 12:00 sharp**

**Goals:** After completing these exercises successfully you should be able to solve simple systems of equations and perform Gauss-elimination. The total number of points is 20.

**Task:** Express each of the following systems of equations as a coefficient matrix and and an augmented matrix. Translate the augmented matrix into echelon form. If there is a unique solution, give that solution, if there are no solutions, explain why, and if there are multiple solutions, characterise the set of all solutions. Show how you proceed.

1. **(5 points)**

$$\begin{aligned} 2x - 6y + 7z &= 1 \\ 8x - 20y + 33z &= 16 \\ 10x - 30y + 37z &= 9. \end{aligned}$$

2. **(5 points)**

$$\begin{aligned} x_1 + 2x_2 &= 1 \\ 3x_1 + 4x_2 + x_3 &= 2 \\ 6x_1 + x_3 &= 1 \end{aligned}$$

3. **(5 points)**

$$\begin{aligned} x_1 - 3x_2 - 6x_3 - 5x_4 &= 2 \\ 3x_1 - 8x_2 - 17x_3 - 12x_4 &= -1 \\ 7x_1 - 21x_2 - 36x_3 - 33x_4 &= 17 \\ 1x_1 - 4x_2 - 7x_3 - 8x_4 &= 15 \end{aligned}$$

4. **(5 points)**

$$\begin{aligned} x_1 + 2x_2 - 3x_3 &= 0 \\ 2x_1 + 3x_2 + x_3 &= 0 \\ 3x_1 + 4x_2 + 5x_3 &= 0 \\ -2x_1 - 4x_2 + 6x_3 &= 0 \end{aligned}$$