Lab 4 MM5016

Contents

1 Problems

Uppgift 1.1 (System 1). Use Gaussian elimination to solve the system of linear equations

$$x_1 + 5x_2 = 7$$
$$-2x_1 - 7x_2 = -5.$$

Lösning 1.1.1. First step is to eliminate all x_1 under line 1. We do this by adding an appropiate multiple of line 1 to the line we want to eliminate x_1 from. In this case it means to add the first line times 2 to second line. That yields the following system:

$$x_1 + 5x_2 = 7$$
$$3x_2 = 9.$$

Our system is now overtriangular, which mean we can go into the process of solving each equation by themselves by starting from the bottom and substituting into the equation above relative of the equation in question.

So we start by solving $x_2 = 3$ from the second equation. Next step is to substitute this into the above equation and get the equation

$$x_1 + 15 = 7.$$

And thus we can from this equation solve that $x_1 = -8$.

Uppgift 1.2 (System 2). Use Gaussian elimination to solve the system of linear equation

$$x_1 - 2x_2 - 6x_3 = 12$$
$$2x_1 + 4x_2 + 12x_3 = -17$$
$$x_1 - 4x_2 - 12x_3 = 22.$$

Lösning 1.2.1. As in the previous system we start by eliminating all x_1 from all the lines below the first line. To eliminate x_1 from the second line we add -2 times the first line to it. That yields the following equation:

$$8x_2 + 24x_3 = -41.$$

Uppgift 1.3 (System 3). Use Gaussian elimination to solve the system of linear equations

$$x_1 - 2x_2 - 6x_3 = 12$$
$$2x_1 + 4x_2 + 12x_3 = -17$$
$$x_1 - 4x_2 - 12x_3 = 22.$$