Norwegian University of Science and Technology
Department of Mathematical Sciences

TMA4115, Spring 2013, Test 4

Exercise group number:

Name:

NTNU username:_____@stud.ntnu.no

You have 20 minutes to solve the 3 problems. Each problem is worth 10 points, and you need at least 15 points to pass the test. Your answers must be written on this sheet of paper (you can use additional sheets if you need more space for your answers).

Problem 1 Find the general solution to the system

$$\begin{aligned} 2x_1 - x_2 \ -3x_3 &= 4 \\ 4x_1 - 2x_2 - 3x_3 &= 10 \\ 6x_1 - 3x_2 - 6x_3 &= 14. \end{aligned}$$

Problem 2 Row reduce the matrix below to reduced echelon form. Circle the pivot positions in the final matrix and in the original matrix, and list the pivot columns.

$$\begin{bmatrix} 2 & 2 & -3 & 12 \\ 4 & 4 & -3 & 2 \\ 0 & 0 & 3 & -6 \end{bmatrix}$$

Problem 3 Let $\mathbf{a}_1 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}$, $\mathbf{a}_2 = \begin{bmatrix} -1 \\ 2 \\ 2 \end{bmatrix}$, and $\mathbf{b} = \begin{bmatrix} 2 \\ 11 \\ 17 \end{bmatrix}$.

Determine if $\mathbf{b}$ is in the plane generated by $\mathbf{a}_1$ and $\mathbf{a}_2$ (that is, if $\mathbf{b}$ is in $\text{Span}\{\mathbf{a}_1, \mathbf{a}_2\}$).