Norwegian University of Science and Technology
Department of Mathematical Sciences

TMA4115, Spring 2013, Test 5

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 Let $\mathbf{v}_1 = \begin{bmatrix} 0 \\ 2 \\ 1 \end{bmatrix}$, $\mathbf{v}_2 = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$ and $\mathbf{v}_3 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$. Determine if $\{\mathbf{v}_1, \mathbf{v}_2, \mathbf{v}_3\}$ span $\mathbb{R}^3$.

Problem 2 Let $A = \begin{bmatrix} 1 & 2 & 0 & -3 \\ -2 & -4 & 1 & 6 \\ 1 & 2 & 1 & -3 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} 7 \\ -11 \\ 10 \end{bmatrix}$. Describe the solution set of the equation $A\mathbf{x} = \mathbf{b}$ in parametric vector form.

Problem 3 Balance the chemical equation

$$C_2H_6 + O_2 \to CO_2 + H_2O$$

That is, find for each of the 4 types of molecules the right number of molecules such that for each type of atoms, the number of that type of atoms that appear on the left side of the equation is equal to the number of atoms of the same type that appear on the right hand side of the equation.