Norwegian University of Science and Technology
Department of Mathematical Sciences

TMA4110, Fall 2012, Test 9, week 43

Exercise group number:

Name:

NTNU username:_____@stud.ntnu.no

You have 20 minutes to solve the 4 problems. Each problem is worth 10 points, and you need at least 20 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). You are allowed to use a Citizen SR-270X or Hewlett Packard HP30S calculator, and Rottman's "Matematisk formelsamling", but no books or notes.

Problem 1 Let H be the set of all vectors of the form $\begin{bmatrix} 2r+s \\ -2 \\ r-2s \end{bmatrix}$ where r and s represent real numbers that satisfy the equation $r+s=0$. Determine if H is a subspace of $\mathbb{R}^3$.

Problem 2 Let $A = \begin{bmatrix} 1 & 2 & 0 & 3 \\ 0 & 1 & 2 & 0 \end{bmatrix}$. Find a basis for the null space $\text{Nul}(A)$ of A.

Problem 3 Let $A = \begin{bmatrix} 1 & 2 & 0 \\ 3 & 2 & 4 \\ 0 & 1 & -1 \end{bmatrix}$. Find a basis for the column space $\mathrm{Col}(A)$ of A.

Problem 4 Let $\mathbf{p}_1$, $\mathbf{p}_2$ and $\mathbf{p}_3$ be the elements of $\mathbb{P}$ (the vector space of polynomials with real coefficients) given by $\mathbf{p}_1(t) = 2$, $\mathbf{p}_2(t) = t^2 - 1$ and $\mathbf{p}_3(t) = 2t^2$. Find a basis for $\mathrm{Span}\{\mathbf{p}_1, \mathbf{p}_2, \mathbf{p}_3\}$.