Norwegian University of Science and Technology
Department of Mathematical Sciences

TMA4115, Spring 2013, Test 7

Exercise group number:

Name:

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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).

Problem 1 Let $A = \begin{bmatrix} 2 & 4 & 0 \\ -1 & 3 & 7 \end{bmatrix}$, $B = \begin{bmatrix} 1 & 0 & -3 \\ 0 & 2 & 5 \end{bmatrix}$ and $C = \begin{bmatrix} 2 & 3 \\ 1 & -2 \\ 0 & 1 \end{bmatrix}$. Compute $A(B^T - 2C)$.

Problem 2 Let $A = \begin{bmatrix} 1 & 2 & -3 \\ 1 & 3 & 0 \\ 2 & 5 & -2 \end{bmatrix}$. Determine whether A is invertible or not, and find A^{-1} if A is invertible.

Problem 3 Determine which of the following 2 matrices are invertible.

$$A = \begin{bmatrix} 1 & 5 & 0 & -2 & 0 \\ 0 & 3 & 3 & 1 & 7 \\ 0 & 0 & -2 & 7 & 2 \\ 0 & 0 & 0 & 1 & -3 \\ 0 & 0 & 0 & 0 & 6 \end{bmatrix} \qquad B = \begin{bmatrix} 1 & 1 & -7 & 9 & 0 \\ 2 & 2 & 0 & 8 & 0 \\ 3 & 3 & 1 & 1 & 3 \\ 4 & 4 & 3 & 1 & 0 \\ 5 & 5 & 1 & 1 & 1 \end{bmatrix}$$

Problem 4 Let $T : \mathbb{R}^2 \to \mathbb{R}^2$ be a linear transformation such that $T(x_1, x_2) = (x_1 - 2x_2, -2x_1 + 4x_2)$. Determine whether T is invertible or not, and find a formula for T^{-1} if T is invertible.