Norwegian University of Science and Technology
Department of Mathematical Sciences

TMA4115, Spring 2013, Test 8

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).

Problem 1 Compute the determinant

$$\begin{vmatrix} 1 & 0 & -1 & -2 \\ 0 & -1 & -2 & 1 \\ 2 & 0 & 2 & 0 \\ 7 & 0 & -5 & -1 \end{vmatrix}$$

using cofactor expansions. At each step, choose a row or column that involves the least amount of computation.

Problem 2 Let A and B be two $n \times n$ matrices, $n \geq 2$, with $\det A = 5$ and $\det B = 2$. Use the properties of determinants to compute $\det(A^T B^3 A)$.

Problem 3 You are given that

$$\begin{vmatrix} a & b & c \\ p & q & r \\ x & y & z \end{vmatrix} = 3.$$

Use this information to compute the determinant

$$\begin{vmatrix} x & y & z \\ p & q & r \\ 3a+4x & 3b+4y & 3c+4z \end{vmatrix}.$$

Problem 4 Find all values of the parameter $s \in \mathbb{R}$ for which the system of equations

$$\begin{aligned} sx_1 + 2x_2 &= 7 \\ 3sx_1 + 2sx_2 &= 1 \end{aligned}$$

has a *unique* solution. Use Cramer's rule to find this solution (which will be in terms of s).