Norwegian University of Science and Technology
Department of Mathematical Sciences

TMA4115, Spring 2013, Test 13

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). You are allowed to use a Citizen SR-270X or a Hewlett Packard HP30S calculator, and Rottman's "Matematisk Formelsamling", but no books or notes.

Problem 1 Describe all possible least-squares solutions of the system

$$x - 2y = 0,$$
$$x - 2y = 1.$$

Cont'd. on next page...

Problem 2 An experiment carried out to investigate the dependence of a quantity y on the independent variable x produces the data points

$$(0, -1),\ (1, -1),\ (2, 0),\ (3, 1).$$

Find the least squares line $y = \beta_0 + \beta_1 x$ that best fits the above data.

Problem 3 Find the eigenvalues of the matrix

$$A = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 3 & 1 \\ 0 & 1 & 3 \end{bmatrix}.$$

Give the dimensions of the eigenspaces associated with each of the eigenvalues of A **without computing any of the eigenspaces.** Give reasons for your answer.