Norwegian University of Science and Technology
Department of Mathematical Sciences

TMA4110, Fall 2012, Test 4, week 38

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). 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 Row reduce the matrix below to reduced echelon form. Circle the pivot positions in the final matrix and in the original matrix, and list the pivot columns.

$$\begin{bmatrix} 1 & 2 & 4 & 5 \\ 2 & 4 & 5 & 4 \\ 4 & 5 & 4 & 2 \end{bmatrix}$$

Problem 2 Find the general solution to the system

$$\begin{aligned} x_1 - x_2 \quad -x_3 &= 2 \\ -2x_1 + 4x_2 + 2x_3 &= 6. \end{aligned}$$

Problem 3 Find the general solution to the differential equation $y'' + 4y' + 4y = t^{-2}e^{-2t}$ on the interval $(0, \infty)$.

Problem 4 Find the steady-state solution to the equation $y'' + 2y' + 4y = 4\cos 2t$.