TMA4110, Fall 2012, Test 5, week 39

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 Hewlett Packard HP30S calculator, and Rottman's "Matematisk formelsamling", but no books or notes.

Problem 1   Let $\mathbf{a}_1 = \begin{bmatrix} 2 \\ 1 \\ 3 \end{bmatrix}$, $\mathbf{a}_2 = \begin{bmatrix} -1 \\ 0 \\ 2 \end{bmatrix}$, and $\mathbf{b} = \begin{bmatrix} 1 \\ 1 \\ 4 \end{bmatrix}$.

Determine if $\mathbf{b}$ is in $\mathrm{Span}\{\mathbf{a}_1, \mathbf{a}_2\}$.

Problem 2   Let $A = \begin{bmatrix} 1 & 2 & -3 \\ 2 & 1 & -3 \\ -1 & 1 & 0 \end{bmatrix}$ and $\mathbf{b} = \begin{bmatrix} 5 \\ 13 \\ -8 \end{bmatrix}$.

Describe the solution set of $A\mathbf{x} = \mathbf{b}$ in parametric vector form.

Problem 3   Suppose an economy has only two sectors: Goods and Services. Each year, Goods sell 70% of its output to Services and keeps the rest, while Services sells 60% of its output to Goods and retain the rest. If the price of the total annual outputs of the Goods sector is $600, what must the price of the total annual outputs of the Services sector be if each sector's income should match its expenditures?